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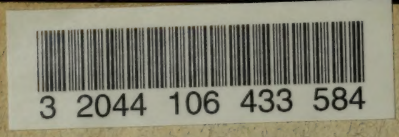
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THE AMERICAN BOTANIST

DEVOTED TO ECONOMIC
AND ECOLOGICAL BOTANY

EDITED BY WILLARD N. CLUTE

Volume XI

JOLIET, ILLINOIS
WILLARD N. CLUTE & COMPANY
1907

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10 CENTS A COPY $1.00 A YEAR

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WILLARD N. CLUTE & CO.
JOLIET, ILLINOIS

The American Botanist

A MONTHLY JOURNAL FOR THE PLANT LOVER

Issued on the 15th of each month except July and August

WILLARD N. CLUTE EDITOR

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SNOW PLANT.—*Sarcodes sanguinea.*

THE AMERICAN BOTANIST

VOL. XI. JOLIET, ILL., SEPTEMBER, 1906. No. 1

UNDER SIERRA PINES.

BY CHARLES FRANCIS SAUNDERS.

TO one accustomed to the dense woodland growth of the Eastern States, the forests of the Sierra Nevada are a great surprise in their openness to the sun. These lines are written in the midst of a Sierra forest, the individual trees of which, in many cases 200 feet or more in height—often rise 75 or 100 feet before the leaf bearing limbs put forth. This fact, combined with the generous spacing between the trees themselves, gives to these primeval woods a sunny cheerfulness quite in contrast with the grave twilight which we naturally associate with coniferous forests.

This cheerful openness, largely free from undergrowth and flooded with sunlight day after day, through the entire summer, ensures an abundant crop of wild bloom, which is the joy of all flower lovers who pass through these mountains. Mariposa tulips, exquisitively marked like butterflies' wings; fritillary with greenish flower bells mottled with chocolate; brodiaeas in lavender, yellow, purple and gentian blue; chamaebatia with solitary strawberry-like blossoms amid fragrant exquisitely dissected foliage spread close as a rug beneath the giant pines; brilliant madias and golden eriophyllums, pansy-faced monkey flowers and gilias in as many hues as Harlequin—all these and many other are new to our Eastern eyes.

But many others are here, too, which a knowledge of the Eastern flora enables us to recognize at sight, though usually of different species from the familiar faces of home. Lupines of various colors, some as fragrant as the wistaria

that clambers about the porches "back East", close set over acres like a carpet and delighting the eye like some far flung fabric of fairyland. Irises, yellow violets (blue ones are *rarae aves* in California), phloxes and fire pinks, lilies and one-flowered clintonias, and tiny wild roses that bloom on lilliputian bushes that may be tucked in one's waistcoat pocket, greet us on every hand. By noisy mountain brooks we find Syringa bushes covered in July with masses of golden centered white blossoms; while hard by is calycanthus in lurid bloom—Western cousin of the beloved "sweet shrub" of old-fashioned gardens. Here, too, are great glorified azaleas, pure white save for a touch or two of yellow, and mats of a creeping, purple flowered ceanothus, easily recognized as cousin to the New Jersey tea of Revolutionary fame. The Klamath Indians call it by a name which means "arrowhead plant", because its small, tough leaves are shaped like inverted arrowheads. There is a quaint Klamath legend to the effect that in the ancient days when birds and animals lived as men, the hawks tipped their arrows with the leaves of this little plant. (See Coville's interesting and valuable "Notes on the Plants used by the Klamath Indians of Oregon.")

A search in the shadier parts of the woods, particularly near streams, will be rewarded by the discovery of several interesting orchids, among them a lovely and fragrant lady slipper (*Cypripedium montanum*). It is a treacherous beauty, however, for it is known to cause a troublesome eruption to some sensitive skins that have touched it. Menzies' rattlesnake plantain is a frequent orchid here, its leathery, white veined leaves spreading in cool undulations upon the dry ground. For elfin siestas on hot mid-summer noons, I know of no more alluring couches. Another orchid found in some abundance is the parasitic *Cephalanthera Oregana,* locally known as "ghost flower", because of its

entire lack of color. A delicate slender plant, draped all in white, it looks in the darkling dells, which it loves to dwell in, the very ghost of a flower indeed. The blossoms exhale the delicious aroma of vanilla, an orchid product, and one wonders if there can be some subtle connection between this child of the north and the tropical bean whose extract flavors so many household "goodies".

The plant student in the Sierra woods is struck with the abundance of plants of the heath order, which are parasitic upon the roots of coniferous trees or amid the decaying vegetable mould. Easily prince of these is the flaming Snow-plant (*Sarcodes sanguinea*), which arrests the attention even of the rougest mountaineers, and the traveler now and then sees specimens set in a lard kettle decorating the porches of mountain cabins. The plant has small claim to beauty of form, being indeed clublike and stocky; its great charm is its color—a rich, glowing crimson, which seen in the sunshine forces an exclamation of pleasure from the most stolid. Contrary to the implication of its name, it does not grow in the snow, but first pushes up to the light after the winter snows have melted. In these high altitudes, however, where the open season is comparatively short, many flowers bloom on the edge of retreating snow banks; and again, a belated snow fall is not unlikely to come after the advent of summer, and blanket the plants about. Under some such circumstances, the snow-plant may first have been seen and named.

Pine-drops (*Pterospora andromedea*) is another heath saprophyte that makes a striking show under the pines. Its wandlike, purplish stalks, leafless and exceedingly viscid, form clumps two feet high or more, strung near the summit with rows of whitish bells of bloom. This is one of the few Sierra plants found east of the Rockies, its range extending sparingly to Western New England, according to Gray.

Everywhere through the Sierra woods the common pteris or bracken fern is abundant, of which John Muir says: "Those who know it only in the Eastern States, can form no fair conception of its stately beauty in the sunshine of the Sierra. On the level, sandy floors of Yosemite valleys it often attains a height of six to eight feet in fields thirty or forty acres in extent, the magnificent fronds outspread in a nearly horizontal position, forming a ceiling beneath which one may walk erect in delightful, mellow shade." Some Indian tribes are said to have used the root as an article of food, though I have not learned how they prepared it. The roots are, however, split for use in basketry, and in order to give a black color to such strands, the squaws are said to chew them for some time, which removes the greenish fibre of the root. In the fall its warm brown fronds are a prominent feature in the autumnal coloring of the forest.

Pasadena, Calif.

THE LEAF ALERT OR DROWSY.

BY DR. WM. WHITMAN BAILEY.

THE murmering or whispering of leaves, so often referred to by writers, is not, of course, inherent to their structure. It is true that the ancient poets endowed certain plants with human attributes. Vergil, for instance, causes the root of mandrake to call aloud in the voice of Polydorus, buried beneath it. The vivid imagination of the Greeks created dryads and hamadryads, living and dying with special trees. Take such beautiful myths as the story of Rhoecus, which Lowell, Arnold, and others have rendered into English verse; or the flight of Daphne from impassioned Apollo, till, to escape him she assumes the form of a laurel tree. These are creations of an ardent and exquisite fancy.

Although leaves have not the power of self-utterance, yet are they played upon by the winds, so that, according to Nature's whim they give rise to softest whispers, soothing lullabies, sublime symphonies, or the harmonious crash of opera or oratorio. Most melodious of these aeolian harps are the needles of the pine, singing ever "in accents disconsolate", and simulating the ocean's surge.

"As sings the pine tree in the wind,
So sings in the wind, a sprig of the pine",

How often we long to interpret this music!

Apart from these sounds, however, or the whistle of sedges along a marshy shore, or the dry rattle of oak leaves persisting throughout the bleak winter, we think of leaves as quiescent, or only moving through the impact of a breeze. Some, indeed, like those of aspen or birch, "palpitate forever", but the pulsing is due to external causes.

Much as one may love a tree, we cannot attribute consciousness to it, though some recent authors appear to think that way. The strange movements we may note, and of some of which we shall here speak, can be explained on purely mechanical principles—unequal tension of tissues, or fluids in unstable equilibrium. In aspens and poplars generally the leaf-stalk is flattened contrary to the plane of the blade, and therefore catches every passing breeze, transmitting the motion to the blade. Rarely do we observe such leaves at rest. They have become symbolic of fickleness.

"O woman, in our hours of ease,
Uncertain, coy, and hard to please,
And variable as the shade

By the light, quivering aspen made",

It has been suggested that the motion imparted to leaves by the wind aids them in their special functions as organs of evaporation and assimilation.

Few people ever imagine leaves as moving by their own volition. As a matter of fact, however, a vast number do daily move more or less in response to light or shade. Particularly is this true of compound leaves so called, where several or many leaflets are attached to a common stalk. Instances of such leaves are those of the rose, of clover, locust and horse-chestnut. Leaves of one blade are called simple.

In the Pulse Family, *Leguminosae,* where the phenomenon is widely prevalent, there are some leaves whose pinnae in closing, point forward and overlap each other; some where they are directed backward; some where they are erect and others that are pendulous. The special method is constant, as a rule, to the genus. It will be observed that in all these cases the closed condition reduces the leaf to the very lowest degree of expansion. This, at once suggests the probable cause of the phenomenon, namely to, as far as possible, lessen the degree of radiation—or as we loosely say, to keep the leaves warm.

Linnaeus ever full of fancy, called the phenomenon "the sleep of plants", and some of the relaxed positions certainly suggest slumber. It may be even, that such repose is recuperative to the plant. We do not know this, nor can we explain or even guess at such remarkable movements as those of the East Indian *Desmodium gyrans.* This plant, closely related to our own tick-trefoils whose jointed, hook-covered pods break up into lozenge-shaped parts and line one's clothes in autumn, as one penetrates a wild copse, appears to have a purposeless movement. But where we do not know, it is well to suspend judgment.

This plant has a pinnately tri-foliate leaf, in which the middle or terminal leaflet is much the largest. This itself evinces some movement, but the small lateral ones are extremely active, keeping up an oscillating movement—and

at the same time sweeping through an arc. To see this movement one must have the plant either in a hot, moist climate—or under similar artificial conditions in a hot-house. The writer has frequently observed them in the fine conservatories of the Harvard Botanic Garden. Gray compares the jerking movements to those of the second hand of a clock, but without the clock's regularity. He writes "Stopping for a time, they again more briskly, always resting for a while in some part of their course, commonly at the highest and lowest points, and starting again without apparent cause, seemingly of their own will. The movement is not simply up and down, but the end of the leaflet sweeps more or less of a circuit. It is not set in motion by a touch, but begins, goes on, and stops of itself."

One is completely lost—at least the writer is—in trying to solve the riddle of this movement. But let us revert to "the sleep of plants" in their more familiar aspects. If one seats himself on a summer afternoon about four o'clock, in a large garden, or perhaps even in the woods, and observes what happens as the afternoon wears on, will, to his surprise, find extraordinary changes taking place in the appearance of the surrounding vegetation. In a botanic garden these alterations are very striking. I have fancied that at times one can even hear a little "click" as the leaves meet in closing.

Early in this garden session, all the leaves will be level and expanded, except, of course, such as are naturally vertical, like the *Iris* and most grasses. The compound leaves, one and all, will be spread open. If it should happen that our observer should doze himself for an hour or so, and then suddenly awake, he will not fail to note that something has happened.

Indeed, a transformation scene is being enacted. A lot of the leaves have closed—others are closing—some even

with a degree of suddeness, and this lessening of exposed surfaces causes a manifest difference in the appearance of the whole landscape.

Among plants in which the phenomenon of "sleep" is very marked, I will mention the sorrels or oxalids, the clovers and their congeners, like melilot, lucerne, all the locusts, and many peas and beans. Then, too, we have the really very sensitive species of *Cassia,* the *nictitans* and *chamaecrista,* very pretty plants of the pea family with rather large, yellow, almost regular, handsome flowers. The mere plucking of these delicate plants is enough to induce almost immediate movement of the numerous pairs of leaflets, which close upon each other till the whole leaf droops like a ribbon. It has a very tired look, and the sleep continues for some time after the disturbing influence has been withdrawn. Very much more startling is the movement in the true sensitive plant of hothouses, the *Mimosa pudica.* Listen to what Gray says of it:

"In the well-known sensitive plant (*Mimosa pudica*) the foliage quickly changes its position when touched, appearing to shrink away from the hand. It makes three movements. First the numerous leaflets close in pairs, bringing their upper faces together and also inclining forward; then the four branches of the leaf-stalk, which here outspread like the rays of a fan, approach each other; at the same time the main leaf-stalk turns downward, bending at its joint with the stem. So the leaf closes and seemingly collapses at the touch. In a short time, if left to itself, it slowly recovers the former outspreading position."

This plant responds quickly to the rays of a burning glass directed upon it, and can be put to sleep by ether or chloroform, awaking again, if the dose is not enough to kill. Of course it is manifest that in this shrinking, the plant ex-

poses much less surface, but why should it be necessary to so quickly pull in sail? Contrast the open and closed leaves and note how changed is the aspect of the plant!

Movement of leaves reaches its acme in that vegetable wonder—the Venus' Fly-trap, *Dionaea muscipula*—a plant nearly related to our familiar sun-dew, but confined to a restricted region about Wilmington, N. C. In this, the blade as it may be called for convenience, consists of two lobes, each cut into sharp teeth on the margin and having the teeth of one side interlocking with these of the opposite. Indeed, the whole contrivance looks like and acts as a trap. The opposed lobes each have on their inner face three sensitive hairs. When these are touched, as by a fly or ant, the trap at once closes, and the more the creature struggles, the more closely he is held. Then, finally he is digested. The kindred sundew, also a gay trap, shows movement only in the disk-crowned, sticky hairs, which clothe it. This plant, too, is insectivorous.

Other movements in leaves might be cited, but already I exceed my space. In closing, let me add that the final movement, "the fall of the leaf" is only so far inherent, that it is provided for early in the season by the "absciss layer", a depression or line of separation that deepens as the season advances. Finally gravity alone, or freezing of moisture in this layer is enough to cast off the leaf. Sometimes, as with horse-chesnut, where yesterday stood a tree still fully clothed, there is today merely the undraped body—the skeleton even of the tree.

Brown Univ., Providence, R. I.

A WORD CONCERNING TREES.

BY FRANK DOBBIN.

IT was Oliver Wendell Holmes who said that: "the elm came nearer having a soul than any other American tree." It is indeed one of the most stately and graceful of

our native trees. But to the lover of nature, every tree possesses a soul or individuality of its own. The "whispering pine."—how we should miss it were it absent from our woods! The eternal freshness of its green, its balmy odor, the crisp crunch of its dead needles under our feet, the solemn music of its threnody, as the breeze plays through its branches; all these were they gone from our forest rambles would leave a blank that no other tree could fill.

Then there are the oaks of which we possess such a variety. Lacking the grace of the elm and the symmetry of the pine, but having an indefinable something about them that one can only characterize by the word strength. What more fitting emblem of enduring power than one of our giant white oaks with its spread of mighty branches, some of them as large as an ordinary tree! When I read Mrs. Heman's lines:—

> "The woods against a stormy sky,
> Their giant branches tossed."

I can always see, against a background of lowering cloud, a forest of oaks and pines, their branches whipped by a wintry gale.

Then there are the common plebeian maples—so common that we almost forget their beauty. Usually six species can be found native with us and the streets of our cities and larger towns are adorned with two or three more—strangers from over the sea, seeking a permanent home in America. The first bright dash of color in the spring woods, particularly if it be a low, swampy wood, is made by the opening buds of the red or swamp maple, and again when the summer is over and a hint of frost is in the air, they are wrapped for a second time in a mantle of red. What painter can ever do justice to the glory of an American forest in autumn! Its fame is justly world-wide. And we must remember that the maple is largely responsible for

this display of brilliant color. The English maples too must have some of this wealth of autumnal coloring or Tennyson could never have written:—

"That beech will gather brown
This maple burn itself away."

In a woodland tramp a botanist, even though he be an amateur, finds enjoyment in looking for rare and seldom noticed species. I mark that day with a white stone when I saw the first tulip tree in my locality—the northern outpost of the species in this region. This station, by the way is only a few miles north of where Michaux mentions having seen the *Liriodendron* in 1792. The sassafras is also a local rarity and it has never been my good fortune to see a large tree, only a few shrubs hiding in the depths of the woods. I am informed, however, that half a century or more ago, a sassafras tree was not an uncommon sight.

We might go on indefinitely, enumerating our native trees, but no pen can do justice to their beauty or their subtle charm. Only when we have lived among them and learned to know them, can we say:—

"Oh, sweet it was and fair it was
In the green woods today,
With only the tree-tops bending near
And all the world away."

Shushan, N. Y.

A NEW DEWBERRY.

BY W. H. BLANCHARD.

THIS dewberry which approaches *R. hispidus, L.* in many respects I propose to name:

RUBUS TRIFRONS, N. SP. Plants nearly or quite prostrate, with three-foliate, glabrous leaves and hispid, glandular, slender canes frequently tipping.

New Canes.—Stems prostrate, starting very late, slender, two to five feet long, reddish, glabrous and terete, covered with a thick growth of bristles, 200 to the inch of stem, and an abundance of glanded hairs interspersed. Leaves thickish, three-foliate, dark green, glabrous and slightly shining on the upper surface; lighter green and glabrous on the lower surface. Leaflets sharply serrate and doubly serrate-dentate, the middle leaflet broadly obovate, the side ones broad-oval with a slight tendency to divide, all somewhat rounded at the base and very short-pointed. Petiole and petiolules slender, slightly grooved, glabrous, bristly and glandular; the petiolule of the middle leaflet less than one-half inch long, the others sessile.

Old canes.—Dark red, the clothing of the stem much impaired, old leaves not persisting. Second year's growth consisting of leafy branches or stemlets, six to 12 inches long, tipped with inflorescence. The axis somewhat angled zig-zag, glabrous with a few weak bristles and glanded hairs. Leaves not thick, three-foliate or a few unifoliate, sharply serrate and serrate-dentate, glabrous, yellow-green. Leaflets short-pointed, narrow oval, the middle one short-stalked, petiole slender, nearly naked. Inflorescence a short raceme, axis 1½ inches long; pedicels about 12 subtended by narrow bracts, set at a moderate angle; peduncle and pedicels slender, hispid, pubescent with glanded hairs interspersed. Flowers one inch broad, petals slender, less than one-half as wide as long; appearing the last of June. Fruit small, maturing, but few drupelets, ripening the last of August.

Type station:—Wait's pasture, West Wardsboro, Windham County, Vt., one mile east of the village. Altitude 1,700 feet open land. Abundant in Stratton, West Jamaica and West Wardsboro.

This species was discovered by me, June 27, 1904. It is abundant in the section named and grows in thick beds

which in flowering time are a beautiful mass of white flowers. The new canes do not hug the ground, but are kept up by the great mass of old growth and tip rather sparingly. It is a coarser plant than *R. hispidus,* which grows close to the ground, branching and tipping readily with shining crenate-dentate, persistent leaves and small inflorescence with inconspicuous flowers.

Westminster, Vt.

CYCAD SAGO.

THE Sago of Commerce is the product of the *Metroxylon Sagu,* a species of palm which is indigenous to the forests of the marshes of Borneo and the neighbouring islands of the Eastern Archipelago. It is also yielded in considerable quantities by several other members of the great palm family as well as by a variety of herbaceous and other plants that luxuriate in the warmth and moisture of the evergreen forests of the tropical world. Of the last mentioned group few are more interesting than the beautiful feathery leaved cycads of India. These humble plants, whose graceful foliage resembles that of some of the indigenous tree ferns or of the delicate rattan palms, occur generally as sporadic under-shrubs in the forests of the plains at low elevations as well as in the secluded valleys of the hills. Their glistening green tiers of abruptly pinnate leaves that are brone in simple whorls at the tops of the stems lend softness and charm to the varied vegetation of the localities in which they install themselves, while their rugged dark brown cylindrical trunks, from the resemblance which they bear to the stems of the palms, have earned for the cycads the misleading epithet of the decorating palms of India and the East.

The tallstemmed, much branched *Cycas circinalis* of the evergreen forests of the Western Ghats and Ceylon and the branched or simple-stemmed *Cycas Rumphii* of the low-lying forests of the Malabar Coast, Tenasserim, the Mergui Archipelago and the Andaman Islands, together with the simple-stemmed *Cycas pectinata,* contain in the inner medulla of their trunks an abundance of edible and nutritive starch. The ovoid fruits of the species, too, that are borne in alternate rows or series upon the edges of the fleshy pedunculate bracts are turgescent with quantities of a mealy starch which is eagerly sought after and consumed by the hill tribes. The excessive periodic demands which fruit-bearing makes on the reserves of starch stored up in the stem result in the latter being left, after fruiting, in a condition of almost complete denudation of that substance. For purposes of exploitation of the cycads for sago they have, therefore to be handled before fruitescence. Moreover, the activity of the species is intermittent; it has a distinct period of growth followed by as distinct a period of recuperative rest. After the first showers of rain of the South-west monsoon, it enters upon its greatest vegetative activity. The sap then ascends rapidly up the stem and a cone of more or less circinate leaf-buds is given out at the top above the circle of insertion of the previous year's fronds; these elongate together and with the older fronds, form the foliage of the plant for the remaining months of the year. When the fronds are young, they assimilate vigorously and soon help to restore to the recesses of the plant the reserve material which had been previously requisitioned. As they grow older, their activity diminishes, until in the cold weather it altogether ceases.. In the hot weather supervening, the fronds turn yelow and, at its close they droop and wither.

The method of extraction of cycad sago may be briefly

described. On the discovery of a well-grown promising individual, it is felled flush with the ground and divested of its fronds as well as of the dry outer layers of its annularly furrowed stem. It is then carried to the home of the operator where he proceeds to cut away all the remaining part of the stem except the innermost cylindrical axis. This delicate core is now carefully sliced into thin oval or circular discs which are spread upon mats and dried in the sun. When quite crisp, they are pounded into flour which is thereafter sifted and mixed in water. The resultant mess is then poured into a pot and allowed to stand until the starchy substance is deposited at the bottom and sides of the vessel. The clear liquid above the deposit is now drained off and the precipitate itself, while yet fresh, rolled about between boards until it resolves itself in the spherical pellets that are known as sago. These pellets, on drying and partial steaming, are passed through sieves that are graduated variously for the several grades, such as bullet sago, pearl sago and the like. The majority of the Indian manufacturers, however, are content with the production of the amorphous meal which, after desiccation, is stored up for use. The elimination of the starchy farina from the seeds proceeds upon principles that are more or less identical with its extraction from the stem of the plant. In some localities, the fragrant ripe fruit is picked and dried until the yellow pericrap shrivels and cracks. The hard endocarp is then broken up and the kernel, while fresh, pounded and mixed with water. In other parts of the country the mature but unripe fruit is split into halves along the sutures of the endocarp and dried until the kernel shrinks and separates from it, after which it is treated in the usual manner.

The yield of dry sago from an average sized stem of about four feet in length and two in circumference amounts to about five pounds. The quantity of farinaceous material

obtainable from the seeds of a plant of the same dimensions averages annually to about that amount. When it is remembered that the sago obtainable from the seeds of the cycad is, for all practical purposes the same in quantity, too, as that from the stem of the plant, it will be admitted that there is no good reason beyond custom, perhaps, to support the practice of felling it for the elimination of the product. It is evidently a practice which the voracity of some barbarous tribe inaugurated ages ago and which their comparatively enlightened descendants on the hills and plains still keep up.—*From an article in Indian Gardening and Planting.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

COLOR VARIATIONS IN A COMMON TRILLIUM.—A short distance from my office there is, in a swampy piece of woodland, a patch, perhaps five feet square, of the common purple trillium in which hardly any two flowers are the same color. They run through all shades from the usual dark red to a light yellow and light green. Some are a pale dirty pink, some speckled and some striped. None are solid colors except the green and red ones. A few smaller clumps near these also show the same variations. Is this something unusual or do they often do it? Have found them in other places when they were a dirty yellow

(*T. Alba*) but never when they showed so many colors.—*J. H. Massey, Bolton, Conn.* (The red trillium is occasionally reported to sport in this way and the yellowish white form is usually called the variety *alba.* In the middle west this plant almost invariably has *pure white* flowers and it now becomes a question as to which plant is really entitled to a name meaning white. In regions where the red *Trillium sessile* and *T. recurvatum* grow, one may often find yellowish flowers, but never pure white ones. This seems to indicate that the pure white flowers mentioned above may belong to a different species.—Ed.)

VIOLA SELKIRKII.—A dark blue variation in the color of this species which I first observed last year has again appeared, evidently intending to be permanent. It is in all respects—large flowers, abundant bloom, beardless petals, season, station and everything—exactly like the type except the color which is much like that of the common blue violet (*V. palmata* var *cucullata.*) It seems to be, this year, nearly as common with me as the species. I would like to know if any of your other readers who are interested in violets (and who is not) have observed any such variation in the color of this species.—*Leston A. Wheeler, Jamaica, Vermont.*

AMERICAN LOTUS SEEDS.—It is stated that the Indians cultivated the American lotus (*Nelumbium luteum*) for the sake of the seeds which they used as food. The seeds were sometimes called yonker-pins, a name derived, no doubt, from the same root as water-chinquapins, by which title they are more commonly known. Another name for the seeds is 70-year acorns, it being a common saying that the seeds take seventy years to germinate, owing to the hardness of the testa or seed coat. Thick seed coats are characteristic of the whole water-lily tribe, and growers of these plants usually file a hole through the seed-coat to allow water to enter when they wish to hasten germination.

Persistence of Certain Wild Flowers.—In many species, owing to the arrangement of flowers and leaves on a single short stem, as in trillium, picking the flowers usually results in great injury to, or complete destruction of, the plant. In others, such as the bloodroot, violet, Dutchman's breeches and hepatica, picking the flowers is of no especial injury to the plant, the only harmful consequences being the prevention of seed production. Plants that depend largely upon the production of seeds to keep up the race are the only ones that suffer much from flower gathering, unless as in the first case mentioned, all the leaves are taken with the flowers. The plants that persist longest in regions where flower gathering is common, are those that have developed two ways of reproduction. In such cases, seed production appears to be principally for the extension of the species into new regions, while runners and underground branches keep up the race at home. It would be exceedingly difficult to eradicate the adder's-tongue (*Erythronium Americanum*) from a locality without plowing up the soil, for each small bulb commonly sends out several runners each of which forms a new bulb. Since only a few bulbs flower annually the supply is kept up. The mandrake (*Podophyllum peltatum*) may be cited as a plant with branching rootstocks that is able to persist under difficulties.

Ibidium Beckii.—Who, except the name-tinkerer, would recognize our common and familiar ladies tresses (*Spiranthes simplex*) under the outlandish name at the beginning of this article? And yet, if we are to follow the leaders of this movement for overturning well established names, this is what we shall have to call the plant. A few years ago a botanist who is considered by his associates as above the average in acuteness, asked us to change the generic name to *Gyrostachys*. Many made the change, but already they find they have been following a false prophet.

Before we are willing to change from *Spiranthes* to either *Gyrostachys* or *Ibidium* we want to be assured that this change is to be the last. Thus far, the only effect the movement for a stable nomenclature has had upon scientific plant names is to make them so unstable that the common names are used by preference when one wishes to be exact. The whole family of orchids has fallen an easy prey to the changer of names. Nearly three-fourths of the names given to the orchids in Gray's Manual are no longer applied to the plants by the "advanced" botanists.

Azalea Occidentalis.—This species of azalea is frequent among the California mountains, and among the sheep herders, goes by the name of sheep- or poison-laurel. It is quite poisonous to sheep, and the herders will often drive their flocks considerable detours in order to avoid localities where it is known to grow.—*C. F. Saunders, Pasadena, Calif.*

Elaborate Terminology.—New terms are not always produced by the systematist; his brother studying the physiology of plants occasionally does something noteworthy. One of his latest is the proposal of the word parallelohelio tropocampylostrophismic to indicate the bending and twisting of a plant toward the light.

Douglas Spruce Tea.—The leaves of that noble Conifer of the Pacific Slope—the Douglas spruce (*Pseudotsuga Douglasii*)—when steeped, make a very palatable, refreshing substitute for Chinese tea, and old mountaineers, when their supplies run low, sometimes use them so; just as hemlock leaves used to be employed by lumbermen in Eastern woods —*C. F. Saunders, Pasadena, Calif.*

The Elder in Florida.—The editor of the *Florida Agriculturalist* has the following to say about one of our common plants. The common elder, (*Sambucus Canadensis,*) is not usually considered an ornamental plant. Yet it

certainly is deserving of a place in the list. About two years ago, we mentioned the fact that it was an evergreen, and almost an everflowering shrub or small tree in this State. Our tree has been almost constantly in bloom since that time. We do not think that there has been a month at any time that there have not been flowers on it. Of course, it blooms more freely early in the spring, and is at this time covered with bloom. One tree is trained to a single trunk, which is 14 inches in circumference, three feet from the ground, and 15 to 18 feet high. It would often have ripe berries, green ones and flowers at the same time if there were no birds. But the latter pick the berries as fast as they color. Try an Elder, you will not regret it.

Vegetables in Alaska.—All plants have their limits as to temperature. There is a maximum and minimum for each species beyond which it cannot go. Some of our northern plants do not grow well in the tropics, because it is too warm; other plants will not grow in the north, because it is too cold. As far north as Alaska most of our common garden vegetables can be grown near the coast, but corn, melons, peppers, egg-plant, tomatoes and pumpkins show their tropical origin by declining to ripen in such a climate.

Bees.—Many a botanist, who knows that bees assist in pollinating the flowers has but a hazy idea of the number of kinds engaged in the work. The bumble-bee and the honey-bee are commonly supposed to be the only ones. The fact is, however that there are nearly five thousand kinds of wild bees, big and little, most of them living solitary lives instead of in colonies as our honey-bees do. A single days collection will bring a dozen or more kinds. These solitary species do not lay up a store of honey, but always leave enough food in the shape of pollen and nectar with the eggs to suffice until the young bee can forage for itself. According to a writer in *Harper's Magazine,* certain bees,

called cuckoo-bees, take advantage of this fact and lay their eggs beside the food stores of their more provident neighbors, in this way acting to all intents and purposes as the cuckoo does among birds.

Shelf Fungus on a Leaf.—The shelf fungi growing on old logs and even on standing trees are familiar objects, but we scarcely look for such hard woody growths upon leaves. Thus far there has been but one species reported with this habit and this has recently been described as a new species. The plant has been known for some time, however. The editor of this journal saw specimens among a collection of South American plants half a dozen years ago.

Possibilities of Species-Making.—In Gray's Manual the section Biota of the genus *Aster* contains but two species which botanists have agreed to call *Aster corymbosus,* and *Aster Macrophyllus.* Both species are fairly common, widely distributed and can live in a variety of habitats. This diversity of habitat, of course, has produced a great number of forms differing in slight degree from the typical species and has long offered a tempting field for the work of the species-maker. It is no surprise, then, to hear that Dr. E. S. Burgess has written a book of more than four hundred octavo pages in which he separates our two well known, but unfortunate plants into no less than eighty-one new species. It is safe to say that none but the author could identify these eighty-one species if the labels should accidently get mixed, but the author, undaunted by this array of species, has named ten more varieties and nearly two hundred and fifty lesser forms! Two species expanded into nearly three hundred and fifty forms. This ought to amuse even the hawthorn specialists. If anybody ever starts in on the human race with similar ideas of what species are, some families will doubtless be found to consist of at least half a dozen new species and possibly one or two new genera.

Editorial.

That the removal of a well-established magazine from one part of the country to another is a task of considerable magnitude we discovered this summer in preparing for the transfer of *The Fern Bulletin* from Binghamton, N. Y., to its new home in Joliet, Ill. It became necessary to close the office of the AMERICAN BOTANIST during the months of July and August and to give all our attention to the extra work in hand. Owing to this, we have been obliged to disappoint applicants for sample copies during the summer, but we are sending a copy of this issue to all who applied, and we trust that this explanation may make matters right. For the first time in five years, the editor and the two magazines are under one roof. A new building has been erected with an eye to their requirements and it is expected that business will now move along better than ever. We hope that we are not too late to secure the subscriptions of those who have asked for samples. At the present writing the back numbers of *The Fern Bulletin* are still to be unpacked, but full files of THE AMERICAN BOTANIST are again ready for mailing.

* * *

In order to start the new volume properly, we are sending with this number bills to all subscribers in arrears. Those who do not receive a bill will understand that their subscription is paid to the end of the year at least. Excepting sample copies, which are plainly marked, the magazine is not sent free to anyone. A large number have taken advantage of our offer to send the magazine for two years for $1.60, if paid strictly in advance. Those whose subscriptions have just expired, may still take advantage of this

offer if their renewals are sent before the October number appears.

* * *

We again call attention to our offer of a year's subscription for each illustrated article that can be used as a leader. The illustrations may be line, wash or photographs, but should be made with reference to our requirements for frontispieces. No restrictions are placed upon the number of articles submitted by one person. Nor need the writers be subscribers to the magazine. A year's subscription goes with each article accepted.

* * *

This magazine is also looking about for an associate editor. Someone who can write acceptable paragraphs for the Note and Comment department is needed. One of the reasons why readers have expressed a preference for this department is doubtless the fact that every paragraph represents the material from which an article of several pages might be made; in fact many of the paragraphs are condensed from such articles. There is not, however, an inexhaustible supply of these articles, as any reader of botanical publications must have discovered. One who can constantly produce available paragraphs will be somewhat difficult to find, we fear. There is now no special reason why this magazine should not make another increase in the number of pages except that sufficient articles of the right kind are difficult to obtain. If we were willing to print anything about plants the task would be easy enough, but we want only the best.

* * *

Since the beginning of this magazine we have printed a goodly number of extra copies of each issue for the express purpose of completing the files of those who are now subscribing, and may desire full sets. Whether the back numbers of a magazine are valuable or not depends entirely

upon its subject matter. The back numbers of many magazines are as readable as the current issues. This we believe to be the case with THE AMERICAN BOTANIST. Every number of the ten volumes issued is different from the rest, and if you like the present one, you will find the others well worth purchasing. The stock of some volumes is becoming very small—there are less than two hundred sets of volume III remaining—and a full set is not likely to be available much longer. If you do not feel like ordering a full set, ask your nearest library to do so. In this way you can always have the magazine near for reference without expense to yourself.

* * *

This winter we expect to dispose of all our odd back numbers as sample copies and for the last time we offer to send free any numbers that may be missing from the files of our subscribers. We are anxious that everyone should have complete volumes. Look up your missing numbers at once. Next month it will be too late.

BOOKS AND WRITERS.

The New York State Library has compiled a list of the best books issued in 1905 for the convenience of other libraries. In this list the editor's "Fern Allies of North America" has been given a place—one of the few scientific books so listed.

Among recently issued books of interest to botanists may be mentioned Wythes and Roberts' "Book of Rarer Vegetables", Slosson's "How Ferns Grow", Henshaw's "Mountain Wildflowers of America", Shelton's "The Seasons in a Flower Garden", and Knuth's "Handbook of Flower Pollination". Several of these will be reviewed in subsequent issues of this magazine.

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CARNIVOROUS PLANTS.

BY GRACE GREYLOCK NILES.

TWO forms of our northern pitcher plants grow abundantly in vast areas of sphagnous boglands, producing odd crimson-purple blossoms in June. It is a rare vision to behold a wild meadow ablaze with these side-nodding blossoms. One variety of this species is distinguished by yellowish-green pitchers with a lighter veining; while the other form displays deep crimson pitchers, marked by deeper veinings. After the blushing petals of these side-saddle flowers fall, the sepals cling to the hard padded shell of the stigma, reminding one of weird goblin blossoms. These remain on the flower for months, until the numerous seeds are sown broadcast over the meadow. The surface of the stigma resembles a padded cushion. Early writers saw in it a resemblance to the pillion, or cushion of a ladies side-saddle, from whence the name side-saddle flower arose. The flowers have no especial fragrance, the attraction of the plant lies in the honey-sprinkled leaves. These consist of large hollow tubes, somewhat resembling pitchers. The rim is ornamented with a band of crimson, upon which is sometimes a secretion of honey. Similar crimson veins extend down the outside of the pitcher to the roots of the plant, and these honey-guides lead small ants and snails upward to the orifice of the pitcher. On the rim these little creatures, as well as the flies and mosquitoes which have been attracted, are allured beyond the line of safety, when they slip down the smooth inner surface to the depths of the watery fluid. All their attempts to escape are useless, once in contact with the contents of the pitchers. And even if the fly should not reach the juices of the tube, the deflexed, honey-tipped hairs

lining the lid would make it impossible for him to back out of the trap. Entrance is delightful; but once within, the sunshine is lost forever.

The leaves of the pitcher plant grow in a basal rosette. The outer and older row of tubes are often filled with their prey. They are the first to wither, turn brown, and in time decompose. With their freight of dead insects they materially enrich the soil which feeds the plant.

A southern species of this genus, *Sarracenia variolaris,* produces a hood which covers the orifice of the pitchers so closely as to exclude all rain; yet the tubes secrete a viscid liquid which causes the death of all insects prying beyond the cover. The western carnivorous plant,*Darlingtonia Californica,* grows in the vicinity of Mount Shasta, California, at an altitude of 1,000 to 6,000 feet above sea level. The pitchers are often two feet high, and an inch in diameter. The top is inflated, and the whole tubular leaf is spirally twisted about half a revolution to the left. The hood, or lid of the pitchers is different from those of the eastern pitcher plant. The top consists of an inflated sac, about four inches across, with transparent windows in its roof, and having underneath an opening, an inch or less in diameter. At the upper extremity of this opening hangs a two-lobed blade resembling a fish's tail, which is attractively colored, and twisted. The inside is covered with stiff, erect, dewy-tipped hairs. The honey-bait, as in the eastern pitcher plant, is situated about the rim of the pitcher, and along the crimson veining of the leaf. A viscid fluid also is secreted in the depths of the tubes, notwithstanding the fact that the dew and rains are absolutely shut out by the twisted, two-lobed blade of the hood. Yet the insects required for the nourishment of this plant are attracted, and must be small enough to pass up through the narrow door of the hood. Insects crawl up the crimson veining of the tubes from the roots, until they arrive at the honey-tipped rim. Others

are attracted by the gaudy bonnet strings of the lid, and alight upon its outer surface. These ribbons are twisted in such a manner that an insect upon the outside follows the honey trail along the spiral folds, and enters the interior before he is aware. The same deflection of bristling hairs occurs in this species, as is observed on the lids of our northern *Sarracenia,* so that when the insect decides to turn about, and make his exit, the bristling spines prevent progress. He now must re-enter the opening beyond, and looks for a place of egress. He discovers the pretty windows in the roof of the inflated tube, and every step over the deceptive hairs bring him nearer to his doom. Escape is impossible.

The Family *Sarraceniaceae* was named by the early botanist, Tournefort, of Europe, in honor of Dr. Sarrazin, of Quebec, who first sent specimens of our northern species, with a botanical account of its home life to Tournefort. It was first described and illustrated in color in Phillip Miller's "Figures of Plants" in 1760. The plate is an excellent one.

Pitcher plants may be easily cultivated, and attract much interest, and always give pleasure to those observing their strange habits. Of course in home or schoolroom culture it is necessary to occasionally fill the pitchers with rain water. The plants are known to country folk as Indian-dippers, or Saint Jacob's dippers. They are also known as huntsman's-cup, hunters and berry-pickers, it is said, using them as dippers or drinking cups. Yet knowing the habits of these pitchers, and their secretion of a poisonous fluid, they should not be put to such use. A cornucopia made of fragrant white birch bark, so plentiful about the forest areas of the north, is a much cleaner and safer goblet.

Many wild animals, it is reported, have learned the habits of the Pitcher plant, and avail themselves of stealing the food which the plant has ensnared in its tubular leaves. Two species of insects are associated with some of the southern

Sarracenias. They evade the seductive honey-trap, and in a peculiar manner store their eggs in the contents of the pitchers, where the larvae are nourished by the moisture and shelter afforded by the hooded leaves.

The Sundew Family (*Droseraceae*), is another familiar group of insectivorous plants, found in haunts similar to those of the pitcher plants. There are but two known genera, all species of which are flesh eating. The genus *Drosera* has seven species north of Mexico, while *Dionaea* has but a single species—*Dionaea muscipula,* which is native to North Carolina.

Our most common northern sundew is the round-leaved species—*Drosera rotundifolia.* It grows in Sphagnum along old wood roads, near brooksides, and in the deeper swamplands, reminding one of a species of moss rather than of a wicked, blood-craving plant. The ladle-like leaves are ornamented with dewy-tipped hairs. These act as tentacles whenever an ant or fly alights upon the leaves to sip the dew, giving out an extra amount of viscid fluid. Like sly little fingers each hair begins slowly to close inwardly, until the prisoner is tightly held by the adhesive dewy hairs. The more he struggles to free himself, the more fluids the plant pours out, and the faster the little hairy fingers close about him. Once the insect alights upon these innocent looking leaves he is doomed.

The leaves lie in a rosette flat upon the sphagnum, and thus attract such crawling insects as ants, and small flies. When an insect is entrapped the leaves throw out and acid, digestive secretion, and after the plant has absorbed the juices of the insect, the dewy hairs, or tentacles, return to their normal position, lying in wait for another victim. A leaf or stone dropped on these bristling leaves will bring about the closing in of the tentacles; but when the plant instinctively discovers the mistake, these tentacles return quickly to their natural

position. Often a tentacle will not begin to move until ten seconds after it is touched, and in from one to four hours it will be completely deflexed. Strangely enough, however, drops of water have no effect upon the movement of these dewey hairs. Darwin once studied these plants and fed them beef steak, and they accepted it as intelligently as they would have received crawling insects.

The whole plant is unique, of a light green, varigated with carmine. In July it produces a spike of insignificant white flowers. The spike is generally one-sided, and not more than one full grown flower appears to bloom at a time. This is always topmost on the spike, and opens only in the sunshine. Another common species of *Drosera* is slender, and produce thread-like leaves which curl in upon themselves, with scarcely any distinction between the stalk and the leaf blade.

The southern venus fly-trap (*Dionaea muscipula*), closely related to *Dresera*, is noted for the irritability of its leaves, which close quickly at the least touch. The leaves are basal in a rosette, as in the round-leaved sundew. The trap portion consists of two jaws at the end of the leaves. Sharp, bristling, stiff, thorny hairs are set about the outer edges of these jaws like comb teeth. These tentacles secrete no viscid juices to attract, or hold the insect. The hairs on the inner surface of these lobes are acutely sensitive, and the slightest touch of buzzing wings causes the jaws of the trap to fly together like the cover of a book. The outer comb teeth bristles interlock, shutting off all possibility of exit for the fly. He is caught before he is aware of danger. Small insects often escape, before the teeth close against them. In the prisoner's struggles he disturbs the interior bristles, and the jaws of the trap tightly enfold him. At the same instant a digestive fluid is poured out from the leaf, and the trap remains locked until the insect is digested, when the lobes of the jaws relax,

open, and assume their natural position. Rain and wind have no effect upon the closing and unclosing of the traps of these carnivorous plants.

New York City.

FLOWERS OF LATE AUTUMN.

WALTER ALBION SQUIRES.

THE autumn is peculiarly an American season. Cold waves sweep down from the far north fresh with the ozone of prairie and tundra bearing an indescribable something which tells us that summer is nearly gone and that winter is approaching. After the frosts and gales of the equinoctial period have passed, over rugged New England hills, about the Great Lakes, far out on the prairies and throughout the defiles of the western highlands, there comes creeping a great wave of color clothing the land in the beauty of the autumn woods; the glorious sunset of the year. No other country has the cold waves so characteristic in North America, Indian summer is hardly known elsewhere. In no other land can be found anything to be compared with the beauty of our woods in autumn.

All nature tends to cause the autumn to become a season of reflection, of crowding memories of the dead days "which we have loved long since and lost awhile". The falling leaf, the flight of migratory birds toward their southern home, the meadows brown and sere which so lately smiled in living green, all speak tenderly of the past, and in the mute language of suggestion they whisper of coming change. This spirit of autumn calm, reflective, mingling recollections of the past with hopes of the future, runs through a great part of our American literature.

Our characteristic autumn flowers are chiefly peculiar to North America. The asters and golden-rods, comprising together over a hundred species in the eastern states alone, are hardly represented in other countries. More than a dozen

species of gentians brave the storms of approaching winter and "glimmer out of sleety dew" to bid us good by for the year.

Willow herb, blue sage and sunflowers are among our most common autumn flowers. Throughout the mountains of the northwest the harebell is often to be found in blossom till nearly Christmas.

In enumerating the flowers of late autumn, there is one eccentric child of the underwoods which we must not forget. One fine afternoon, late in October, I was gathering autumn leaves within sight of the blue expanse of beautiful Lake Michigan. I had stopped to examine the yellow leaves of a group of low shrubs, wondering what they were, for I had never seen them before and had been in the country only a few weeks. Soon I noticed that the branches were thickly set with peculiar yellow blossoms. Among the flowers were odd, woody-looking seed vessels, containing shining black seeds. I essayed to pry out one of these, but had hardly touched it when it was no longer there. I tried another when something whizzed past my ear and I heard a faint rattle among the dry leaves some yards away. A strange plant it seemed, indeed, clothed with the yellow of falling leaves and opening blossoms, quietly preparing for another growth of seed and shooting last year's crop into places more favorable to growth. There seemed something familiar about it and my mind went wandering through the labyrinths of memory, digging up the forgotten things of all I had ever heard or read until it turned up something and there flashed across my mind the word witch-hazel.

Besides these true autumnal flowers there are in many localities certain spring flowers which frequently produce blos-

soms in the fall. In this part of the west spring beauties, speedwell, wild geranium, strawberries and buttercups are to to be found almost every autumn.

The flowers of spring being much of joy and expectation, but the flowers of late autumn touch with a tender pathos the deeper emotions of the thoughtful soul; regions where lie thoughts too deep for words; border land of the human and divine where we catch faint perceptions of a beauty eye hath not seen, of a harmony ear hath not heard, of the touch of an infinite hand.

Denver, Idaho.

THE UMBELLIFERS.

BY DR. WM. WHITMAN BAILEY.

THE Natural Order *Umbelliferae,* the Parsley Family, though relatively small as compared with many other groups, is of singular interest and importance. This is due to its strongly contrasted economic features. While it furnishes many condiments, like caraway, anise, coriander, and lovage, it is the source also of a few well-known violent poisons, the true hemlock (*Conium maculatum*), the water-hemlock (*Cicuta maculata*) and fools-parsley (*Aethusa Cynapium*). Others are characterized by pleasant smelling herbage, as sweet cicely, fennel and lovage.

Were it not so familiar a phenomenon, we would all be impressed by observing noxious and innocent plants growing out of the same soil. We see thus how good or bad character may develop from originally the same elements; the result depends upon how these are received and treated. There is, too, an interesting tendency to good or evil, in case of these plants inconvertible. To be sure, in some cases man renders them

innocuous, as with celery or fennel, by bleaching. But it must always be had in mind that this is a dangerous family wherewith it is unsafe to recklessly experiment. Two of its genera, say *Aethusa* and *Petroselinum* may be growing side by side, the first "a fetid poisonous herb", the second, freely used on our tables, though mainly as a decorative trimming.

Parsley, by the way has some curious associations with folk-lore. Says Lindley, "it has ever been an object of superstitious observances; for besides its being the assigned plant from beneath which came our brothers and sisters, we remember how it was always considered such ill luck to transplant it, that but few people could be got to perform such an act. It is thought probable that this plant was dedicated to Persephone, as Queen of the Dead, presuming her to be identical with Hecate or Selene, the resemblance of its Greek name (Selinon) to that of the last-named divinity at once suggesting its direct derivation from her."

Umbelliferae are closely allied with the *Araliaceae,* which include our ginsengs and sarsaparilla. These plants differ only in their fruits, which are usually fleshy and often polycarpellary, whereas, as we shall see anon, the Umbellifers, as a rule, have but two, dry carpels, forming together the familiar Schizocarp of that order. In some marked features, they also approach the dogwoods or Cornels.

The plants of this family are markedly of north temperate range, and are especially characteristic of the Mediterranean region and Central Asia. As regards height, they appear to reach their acme in Kamtschatha, where they are almost arboreus in habit. To those who know our great cow-parsnip (*Heracleum lanatum*), it is not difficult to conceive plants of this type reaching gigantic dimensions. In such case, with their ample foliage and immense, broad umbels, they are striking features of the steppe landscape.

Let us now consider their structural characteristics. Usu-

ally herbaceous, the stems are generally hollow, fluted or striated, so as to resemble Doric columns. Sometimes the stems are knotty, fistular, or pithy. The leaves, always alternate, are dilated below into sheathing petioles, familiar to us in celery, where it is these, that by bleaching are made palatable and even delicious. The blade is rarely entire, usually more or less compound or dissected either pinnately or palmately.

It is from the inflorescence that the family derive its name. The flowers are borne either in simple or compound umbels, with or without involucres and involucels, or else, much more rarely in heads, as in *Eryngium, the* peculiar button snakeroot of our western plains. These, with their yucca-like aspect, scarcely suggest the family and are sure to be a surprise to the eastern collector seeing them for the first time.

The individual flowers of the family have the calyx adherent to the ovary, and either with five very minute teeth or none. Then comes an epigynous disk, outside of which are inserted the five petals, acuminate, but with the tips so inflexed as to give them an obcordate appearance. The range of color is limited to white, yellow, blue, or lavender, as a rule, and all the flowers are small. In some cases, to a degree in our common carrot, the peripheral florets are somewhat larger than those of the disk and may be abortive. Carrot most commonly has one central flower of a deep maroon color, giving the effect of an insect alight upon the umbel. The function of this solitary floret is not definitely known. It may be an enticement or guide for small flies.

It is from the fact that the flowers are so nearly alike throughout the entire group, that they fail to furnish definite classification features, hence, the fruit and seed only are to be certainly relied upon in identification. These furnish an interesting puzzle to the student. The writer has never considered it fair to dismiss them "as too difficult for the beginner." Possibly that is true for children's classes, but long experience has

proved to me that the average college student soon catches on to the trick of naming them and considers it great fun. To think that a mere half-fruit, properly known as a "seed" is sufficient material with which to certainly name an unknown plant, stimulates his curiosity and desire. Marked attention is always given to these interesting plants.

We will now consider their peculiar fruits or schizocarps, which in ripening from the bi-carpellary ovary, form two mericarps, each the reflection of the other. The student tracing the plant, first settles whether it has simple or compound umbels or heads. Next, he considers the external aspects of the fruit as a whole, its shape, number of ribs, etc. Some of these ribs may extend into flattened single or double wings. A typical fruit has both primary and secondary ribs; these are distinguished by situation. The first primary is on the middle of the back of each carpel. Where the two carpels adjoin is known as the *commissure.* In ripening the halves separate and hang apart on a branching hair-like process, the *gynophore.* Lying between or under the ribs, or in both situations, and may be also on the commissure, are channels, running longitudinally in the substance of the carpel, and filled with a volatile, fragrant oil. These are known as *vittae* or oil tubes. As the number and relative prominence of ribs, wings, and oil tubes are positively distinctive of the different genera, they must be closely observed. For this purpose, a mericarp is sectioned cross-wise, when the ribs appear as prominences and the oil tubes as brown or darkened dots. This section, too, brings out another all-important feature, namely the shape of the contained *seed,* which is flat or flatish, or round; or else semilunar or crescentic in outline.

The beginner must definitely bear in mind that the *whole* object is the fruit; that half of it is a mericarp, and that one seed, observed only in section, lies in each half. He must rid himself of the confusing notion that the caraway or anise

in a cake is a *seed;* it is a whole or half *fruit* containing the seed.

It follows from what has now been said, that Umbellifers must be collected in full mature fruit. Thus only can they be identified. Never send them to a botanist to name in flower only. He can legitimately decline to be perplexed with puzzles and the whole profession will sustain him.

Brown University, Providence, R. I.

ABOUT COLLECTING.

BY M. F. BRADSHAW.

IS there a growing sentiment against collecting? I am not sure, yet there comes a faint recollection of someone scoring mildly the naturalist who collects things. Was it in the pages of our own BOTANIST, or have I heard it elsewhere? To be a collector, only, is a small sort of business to be sure, but then it is better than not to be interested in nature at all. One cannot get together a lot of things without knowing something about them, and if one is a student in the real sense of the term, how can he remember all he observes in all the objects he studies? Make notes? To be sure, yet in time what a volume of manuscript to look over whenever he fails to recall some particular feature or when he wants to make comparisons. How much easier, quicker, more accurate to turn to the collection.

All of which assures you that I believe in and make collections. In Botany, my herbarium has been of great value where the species of some genera are so alike, it is hard to tell which is which of some such weeds as the *Chenopodiums* or the *Franserias* or *Baccharis.* Only spreading them out side by side and carefully comparing them will serve to give a clear idea of their differences. But the collection that gives me the most pleasure is the seeds. Herbariums harbor bugs that riddle the cardboard sheets

as though I had fired a load of shot through them, and then sometimes I find a colony of little white grubs all nicely gorging themselves on one of my most choice specimens. Haven't I fumigated them? Surely, and nearly strangled myself with strange and unholy fumes to which I objected with all my soul, but I could not see that the bugs and the worms did; they even throve on it.

But seeds are clean, and they stay clean, and they are beautiful to look at; even the most indifferent people admire them. There are those who could not be hired to read a page of botany in print, but they will look through the seed cabinet with delight. I wish I could induce you all to try it; I am sure one season would convert anybody. To interest one of my friends who collects shells, ferns, algae and other things, and who also is a botanist, to try seeds, I finally, after two years of writing about it, asked her to get all the varieties of beans she could and put them in small trays, all of one size, and see if she did not admire the result. To please me, I suppose, she did it, and said in her next letter that she was adding all of the legumes, and the next letter it was nuts, and now I think her collecting of seeds is in full swing and has taken possession. Does anybody think she will care less for plants now than before?

All of the small seeds should be put into vials—or the naturalist's glass tubes—and those larger into pasteboard trays, 2x2½x¾ inches deep. These trays I make myself, of a light quality of bristol board, covered with white paper. The larger seeds such as nuts and the pits of fruit go into thread boxes—mine are No. 40—covered white also. As I have plenty of cabinet room, I have in some cases put the prettier seeds of medium size in both vials and trays—for instance *Ricinus* beans. As the number and name are the same, it does not make any difference in the catalogue, but is only to add to the beauty of the cabinet. I also let my-

self have all the varieties I can find, as in the beans, I have no less than forty kinds of every color and spotted and blotched; but they are mostly labeled "85 *Phaseolus vulgaris.*" This is the gayest drawer in the cabinet, but the nuts are equally lovely.

If any wise man says this is childish, he is welcome to his opinion. Don't we all know it is good to be children once in a while? Whether we call it work or play, I know there is much of botany we will learn in this pursuit, that might altogether slip by us otherwise, because we are always looking for flowers.

The dried weeds are not attractive, and we hardly see them, except to think they are a blot on the landscape; but only when we are collecting seeds do they look interesting.

I commend you all to the study of seeds and seed vessels, and assure you a new world of wonders will be revealed.

Orange, Cal.

OTHER SCOTCH IMMIGRANTS.

BY A. S. FOSTER.

THAT brainy and ubiquitous race on the bleak hills of Scotia is well represented on the northwest coast of America; and, loving his own hills not less, but his opportunity to grow more, he would bring some little reminder of his auld hame with him; so, when he sits down to home making, figuratively squats, on a quarter section, he must have a wee bit of the furze and a sprig of his broom; and they are forthwith rooted in this generous soil.

Scotch Broom (*Cytisus scoparius*) was introduced into Western Oregon about fifty years ago; now, it bids fair to become a prolific acquisition to the diversified flora of the northwest. Having become naturalized it is able to preempt any of the unoccupied territory and, like the fox

glove, (*Digitalis purpurea*) another alien, will locate on the roadside if no better situation offers, and it is permitted so to do, covering unsightly hill-sides and adding to the luxurious abundance of our flora. Under these circumstances it is liable to usurious rental for the mender of highways is accustomed to use the next at hand to fill up chuck-holes in the road in lieu of other brush.

Its cousin german and next door neighbor is furze, (*Ulex Europaeus*), or ling as one old Scotsman told me, lingering lovingly on the word as though it were a full freighted argosy of youthful and cherished recollections. So homesick for a sight of it that he wrote his old mother to send him some seed "right away off". It is useful as a binder of the drifting sands about Shoalwater bay and on the Ilwaco peninsula where that other Scotsman, David Douglas, in April, 1825, first saw his *Pinus grandis,* (properly, *Abies grandis* Lindley) and picked up *Rubus spectabilis* and *Gaultheria Shallon.* When once introduced it grows in riotous profusion and can be found in many localities from Vancouver Island southward to Point Arena, California.

There is a small tract of two or three acres near a certain "little red school house" contiguous to a village called Sunshine, although the house is now yellow and often the fog-blankets are full width and four thicknesses, yet the furze occupies this common to the exclusion of much of the other coastal shrubbery. Our western humming bird, *Selasphorus rufus,* has colonized this forest of furze making it an annual breeding place. About the first of June any youthful chum could show you a dozen nests, about breast high, very little effort being made at concealment, wherein were eggs or fledgelings while scores of solicitous parents were hovering almost in reach or darting hither and yon in an attempt to draw your attention from their tiny nests. From mid-January to mid-summer the bloom is very profuse, which

attracts millions of insects upon which the birds feed. In the struggle for possession as the furze keep down other intruders so do the rufous humming birds drive away other feathered intruders. It is very interesting to watch the love-flights of these feathered gallants while you inhale the fragrance of the scented air.

Portland, Oregon.

NOTE AND COMMENT

GOLDEN CURRANT IN OREGON.—*Ribes aureum* is found along the banks of the Columbia and Walla Walla rivers, about Wallula, Wash. Prof. Sheldon thinks that it is quite probable that it was distributed westward from Missouri by the Lewis & Clark expedition.—*A. S. Foster, Portland, Oregon.*

A LARGE ARISAEMA.—In the Catshill mountains, in June 30, was found a giant specimen of a Jack-in-the-pulpit. A division of the leaf measured eleven inches in length, and seven inches in breadth. The spathe was seven inches long. The leaves had the effect of a large umbrella.—*Miss Mabel Dimock, Peekamose, N. Y.*

GERMINATION OF AMERICAN LOTUS.—In writing of the germination of the American lotus seed, you say, on page 17 this volume, that "growers of these plants usually file a hole through the seed coat to allow water to enter when they wish to hasten germination." I have had some experience with the germination of these seeds, and find if they are put into water and rich mud while still fresh they will germinate and throw out leaves in about 25 days. This is nature's time, and method of planting this fruit. In the wild state, by the time the

"acorn" have matured in the torus, the flowering stalk has become weak and bent over, so as to allow the ripe fruit at the top to fall into the mud and water, when germination may at once begin. Several young leaflets may be thrown out and the new plant be well on its way before the cold season sets in.—*J. Schneck, Mt. Carmel, Ill.*

Color of Buds and Growth.—Vegetation does not awaken in spring until sufficient heat has been received by each plant to revive its dormant protoplasm. The amount of heat necessary for this differs with the species being usually greatest in the species with southern affirmities. Small differences often have a considerable effect in this matter, and in the buds of our forest trees so slight a thing as the color of the bud-scales plays an important part in their development. It is well known that dark colors absorb more heat than light ones, and it is the rule with our trees that those with dark buds are first to show leaves in spring because they have been able to secure more warmth because of their color.

Objects Imbedded in Trees.—A recent item in a local newspaper, referring to the finding of an iron chain, embedded within the trunk of an old cherry tree, reminds the writer of several instances near at hand. I often pass a red maple (*Acer rubrum*) through the trunk of which, about twenty inches below the crotch, a log chain is hanging. Since the placing of the chain in the tree fork some years ago, the enlarging, diverging branches have simply come together at their bases, and the soft sap wood has more or less united, making a continuation of the main stem. The chain literally passes through the middle of the trunk and could not be removed without splitting the tree in half. A river birch (*Betula nigra*) was noticed not long ago along the shore of the Chesapeake, with the bleached remains of a fisherman's clay pipe protruding from its side. Here at one time had been the crotch in which it rested. Birds and squirrels are much ad-

dicted to leaving objects in these arboral resting places. While felling some trees several years ago the writer found in the heart of a post oak (*Quercus stellata*), a curious collection of cherry stones, and the shells of hickory nuts. They occupied the centre of the bole and were a foot or more below the then present crotch. Some of the shells had been split open by action of frost before finally becoming enveloped between the expanding branches. The cavities, where once kernels had been, were found to be tightly packed with the soft cellular tissues, comprising the newly formed bark and wood.—*J. Ford Sempers, Aikin, Md.*

A Freakish Datura.—A curious departure from the regular forms of one of the Solanaceae came under my observation late last summer. Among the *Datura meteloides* I found one so entirely different from this species, yet undoubtedly belonging to the family that I considered it worthy of note. It grew in the same sprawling fashion as does the *meteloides,* but its foliage was smaller and more finely divided The fruit was smooth, not the least prickly, and the blossoms were most peculiar; the calyx was spathe-like, the corolla united *only* at the base; the lobes hanging down in the same fashion that the lobes of the common *Datura* would hang if they were torn apart and left hanging from near the base. In color and odor it resembled the type, but the listless, lazy-looking petals are a curious travesty on the crisp funnel-shaped corolla of the *Datura* that grows in such profusion along the roadside. I gathered the unopened buds and let them open in the house, sheltered from wind or sun, so there cannot possibly be any mistake about the blossoms. Except the *Datura meteloides,* the only Solanaceae growing near was *Solanum Douglasii* From whence came this strange hybrid, (if hybrid it is). California produces many curiosities among her plants, so many in fact that one can but wonder if this be Nature's experimental garden, where she not only produces puzzling

novelties, but strange freaks and curiosities.—*Elizabeth A. Lawrence, Los Angeles, Cal.*

THE MULLEIN IN OREGON.—I have found the mullein (*Verbascum thapsus*) for 250 miles up the Columbia River from Portland. It seemed to have been established in the early settlement of the country, perhaps by the Fur Traders at the old post of Wallula, Wash., where David Douglas lived in 1825-26.—*A. S. Foster, Portland Oregon.*

NEW BOOKS ON BOTANY.—We all like a new book on plants and though we may buy every one advertised that appeals to us, we still crave another. I have just become the happy possessor of two new ones, by the simple method of getting bound the first eight volumes of the AMERICAN BOTANIST. Four volumes make a book of nice size. To look through them and browse here and there is almost the same as having something quite new, for where so many things are worth remembering, who could have kept them all? Try it. —*M. F. Bradshaw.*

THE AMERICAN HOP-TREES.—In many localities the hop-tree (*Ptelea trifoliata*) is a familiar object. It is especially noticeable in autumn when the clusters of yellow winged fruits, like exaggerated elm-seeds are ripe. These fruits contain a bitter principle and have been used in brewing, hence the common name. Besides the hop-tree of the Eastern United States, four or five others are reported as common to our Southwest. These latter species, with the addition of a few from Mexico, have given Dr. E. L. Greene the excuse for publishing a paper in "Contributions from the United States National Herbarium" in which about a dozen species are expanded into no less than fifty-nine. We have often contended that by accepting insignificant characters as of specific value, a great number of species could be made out of any plant group, such

as the maples, buckeyes, birches, etc. Dr. Greene seems to have proven the truth of our contention, but it is to be regretted that the National Government has concerned itself with species-making of this nature.

Production of Vanilla.—Among the ten thousand or more species of orchids in the world there are few that are commercially valuable except for the beauty of their flowers. A conspicuous exception is the vanilla from the seeds of which the well known flavor is obtained. During the past year, no less than four hundred and twenty tons of vanilla reached the market, the principal supply coming from the tropical islands of the old world.

The Peanut as Food.—The little peanut that only a few years ago was considered by physicians as unfit to put into the stomach, is now the basis of food products of one of the largest sanitariums in the country. Analysis proves it to contain three times the nutriment of beef, hence as it becomes better known and its value realized it enters the bill of fare in the shape of peanut butter, salted peanuts, soup, cakes, etc. Many vegetarians through the country use no other bread lubricant than peanut butter, which has been prepared from the roasted nut.—*American Nut Journal.*

An Epiphytic Virginia Creeper.—In the crotch of a large locust tree (*Robinia Pseudacacia*), near my home, a thrifty plant of Virginia creeper (*Ampelopsis quinquefolia*) has been growing lustily for some years past. When first noticed the main stem was less in diameter than a lead pencil. The plant was then probably several years old. In the eleven years that have elapsed since its discovery, the stems and lateral branches have become much longer, some of them an inch and over in diameter. They trail to within a few inches of the ground, and have climbed thirty feet to the top of the tree. The plant makes a vigorous growth each year, though it has no possible connection with the ground. Besides de-

composed leaves, and other vegetable debris likely to accumulate in a tree crotch, there must also be a decayed portion of the trunk within reach of the creeper's roots, from which additional supplies of plant food are available. However that may be, the plant appears perfectly normal blossoming and fruiting each year, and in every respect, behaving as its neighbors do, whose roots are in the soil.—*J. Ford Sempers.*

Another Soapwort.—I have been interested lately in a plant bloom, the root of which the Mexicans make use of for soap, as it is quite saponaceous. It is *Chenopodium Californicum*, a perennial. The leaves have a little of the same quality and I have raised about as much lather from them as from bouncing bet. I have wondered whether this same saponaceous quality may not exist in our eastern *Chenopodiums.* Don't you want to look this up during the pigweed days this season? Those with perennial roots would perhaps be the most likely. *C. Californicum* has a root a foot or two long, which makes quite a respectable cake of soap.—*C. F. Saunders, Pasedena, Calif.*

The Yellow Fringed Orchis.—The editor of the *Florida Agriculturist* reports finding the flowers of the yellow fringed Orchis (*Habenaria ciliaris*) of all shades of color from deep orange to pure white. The plants with white flowers are usually considered to belong to a separate species, the white fringed orchis (*H. blephariglottis*), but since the chief distinguising mark of the two so-called species is the unreliable one of color, it has often been suggested that they are but forms of one species, just as the two color forms of the meadow lily (*Lilium Canadense*) are known to be. Some plant student desirous of some experimental work might sow all the seeds from a spike of the yellow fringed orchis and bringing the resultant plants to maturity, note whether any of the seedlings produced white flowers. If so, the identity of the two might almost be considered established.

EDITORIAL

A large number of our subscribers have written to say that they have not received copies of the July and August numbers of this magazine. For the sake of these and others who may contemplate writing, we beg to say that last June we adopted the policy of omitting the numbers for July and August of each year. At the same time we increased all the other numbers of the magazine by four pages each so that subscribers will receive just as much for their money as formerly, only arranged differently. The volumes now begin in September and February and consist of five numbers each. The vacation habit has grown so prevalent that many of our readers are not at home through the heated term and the magazines in consequence are often mislaid or lost. We are inclined to think that the majority will favor this new plan of issuing the magazines in the months when they have more leisure to read. Indexes have been issued for volumes I to IV and for volume X. The others will be issued as soon as possible and mailed to all subscribers free.

* * *

The agitation in favor of a rearrangement of the rates at which magazines and newspapers are carried in the mails has resulted in thr exclusion of *American Ornithology* from the second-class mailing privilege. The extra cost of mailing the magazine, which this necessitates caused the publishers to suspend publication. The magazine was one of the best of its class, and we regret very much to see it cease publication. The *Amateur Naturalist* has also fallen under the ban, but its editor keeps steadily on his course with no thought of suspending.

* * *

Each month, before the numbers of this magazine are sent out, three hundred copies are reserved for making into complete volumes, and yet, so lively has been the sale of these, that

the supply of some volumes has been reduced to less than a hundred sets. Many people imagine that in selling its back numbers, a magazine is getting paid for practically worthless stuff. This may be true of the magazines whose contents are of temporary interest, but all technical magazines are worth preserving and reading again and again. The contents of THE AMERICAN BOTANIST consist of interesting and pertinent facts. A hundred years from now they will be just as significant as they are at present. They will bear frequent reading for no one can carry all this information in his head. They will form a better encyclopedia of economic and ecologic botany than can be found anywhere else for the money. And less than one hundred more persons can hope to own a complete set! Our offer to supply free the numbers missing from subscribers files is hereby withdrawn for all volumes preceding volume nine. The supply is exhausted.

* * *

Occasionally we have a dissatisfied subscriber. One such recently ordered his subscription stopped and added: "There seems to be no common language in which we can talk about plants intelligently unless we have made a study of them and this I cannot find time to do." This again points to the fact that the common language of botany is almost a separate dialect and raises the question whether a magazine can be made at once so clear in expression and so interesting botanically as to secure the requisite number of subscribers to make it a paying enterprise. An examination of the most "popular" guides to botany will show a vast number of technical terms which must be understood before the book can be. These terms, however, soon become familiar without conscious effort if one attempts to use the guide and since this is so, it does not seem worth while to make a magazine too untechnical. A few puzzles in one's reading is good for anybody and the very acquiring of the facility to use botanical expressions increases one's vocabulary immensely. Incidently, however, the readers of this magazine will note the rare company they are in if able to understand its contents.

BOOKS AND WRITERS.

Still another "How to know" book has appeared. This is entitled "Mountain Wildflowers of America" and is written by Julia W. Henshaw. Our country is now so well covered with books for identifying the wildflowers that the book is rare indeed that finds a phase of the subject intouched. The present volume, however appears to be one of this class. It deals principally with the plants of the western mountains, but includes practically all that are found in elevated regions throughout the country. A few plants are also included that are not normally mountain plants such as the common buttercup, ox-eye daisy, pigweed, marsh marigold, and sweet clover. The book follows the accepted form for such things—the common and scientific names, a technical description of stems, leaves, flowers and fruits followed by considerable matter of popular interest on a wide variety of subjects related to the matter in hand. The illustrations, one hundred in number, from photographs by the author, are of uniform excellence and of themselves worth the price of the book. The book will be most usable in the northern Rockies. Nobody visiting that region on botanizing bent should be without a copy and those in other mountain regions will find it desirable. (Boston, Ginn & Co., 1906. $2.00 *net*).

Margaret Slosson's "How Ferns Grow" is a book for the student of fern structure rather than for the cultivator of these plants. It consists of forty plates, illustrating the changes that take place in the fronds of some eighteen species of ferns from the sporeling to maturity with more or less explanatory text. The illustrations are illustrative though not very well done, and the text is not as lucid as it might be. Taken altogether however, it is a book that will be of some considerable value to fern students, but one that is not likely to have a very extended sale. The author has followed "The American Code" of Nomenclature, this apparently being the title of the style of nomenclature favored at New York and Washington. In this book *Asplenium ruta-muraria* will be found under *Belvisia ruta-muraria.* (New York. Henry Holt & Co., 1906. $4.00 *net*).

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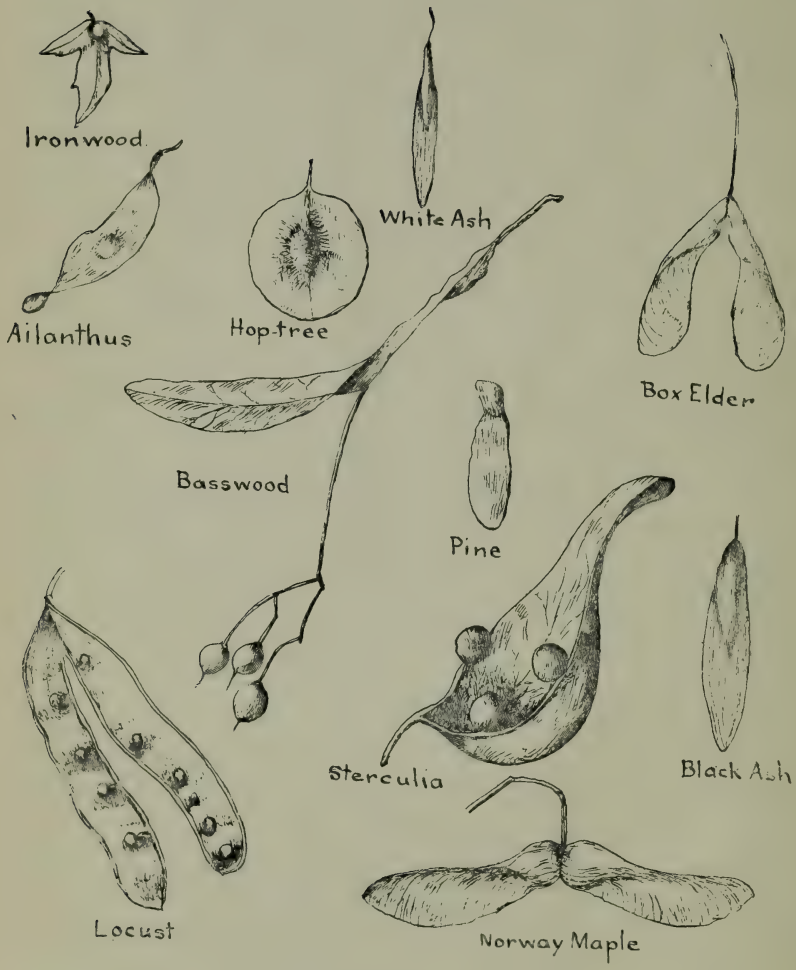

WINGED SEEDS.

THE AMERICAN BOTANIST

VOL. XI, JOLIET, ILL., NOVEMBER, 1906. No. 3

WINGED SEEDS.

BY WILLARD N. CLUTE.

NATURE has adopted many ways for distributing and planting her seeds. There are seeds cunningly hidden in a juicy pulp to beguile the birds to distribute them; there are seeds with artfully contrived hooks and barbs designed to hook into the clothing of mammals and thus be transported to other regions; there are seeds with a variety of silky parachutes with which they may go ballooning on their own account, but in none of these contrivances has the mother of all shown greater versatility of invention than in the fashioning of her winged seeds.

The winged seeds are not simply equipped with an expanded portion to aid them in sailing down the wind. Many other things must be attended to. The seed must be weighted just right and properly placed with regard to the center of gravity; the wing must be so set to the breeze as to ensure that the seed will be carried a long distance, and various ingenious contrivances must be devised for sustaining the weight of the seeds in the air as long as possible. There problems, which still puzzle man in his own efforts at aerial navigation, have been solved again and again by Nature and each time in a different way as if to show the multiplicity of her resources. In imagination one may look back through the untold centuries and see her trying this and that invention. We see how the seeds not properly adjusted to all the conditions dropped beneath the parent tree and were crowded and starved out as miserable failures while those more perfect fared on into new territory, there to reproduce a new plant and more seeds as perfect as the original. Then, too, a judicious selection had

to be made of the plants to bear these seeds. The burs, the berries, the ballooning seeds might be borne near to the earth, but seeds that were to be launched on the breeze had to be hung high in air to ensure a good start and as long a distance as possible from the ground.

Since the pines, spruces, and their allies are among the oldest of seed-producing plants, the pine-seed is doubtless of one of Nature's first creations in winged seeds. In this the wing is thin like that of an insect and made from the outer coat of the seed. Primitive as it is, the immense coniferous forests spread over the globe attest to its efficiency. It does not merely fly with the wind as a bit of paper might. When let out of its scaly casket it begins forthwith to spin about with the center of the seed for an axis and thus retards for a minute or more its descent from the treetops to the earth. Meanwhile the breeze, be it ever so light, has borne it on to new opportunities for growth and development.

The ash key is fashioned after the pattern adopted for the seed of the pine, but here it is the ovary instead of the seed coat that is produced into a wing. The seed or rather the fruit, since this is a ripened ovary, spins in much the same way, in a plane parallel to the surface of the earth, and so comes slowly to its final resting place far from the parent tree. It is interesting to note how the various species of ash have varied the pattern of their fruits from the slender oar shaped key of the white ash to the broader clumsier pattern of the black ash, and yet all are equally effective in flight.

So characteristic is the winged fruit of the ash and other trees, that a special word, samara, has been coined for it. The samara is the badge of the ash and maple families, the ashes bearing their keys singly and the maples in pairs. By this sign the unmaplelike box elder shows its kinship with far nobler trees. Of slightly different pattern are the rounded samaras of the elm and hop tree, each with its single seed in the

center, but they are samaras none the less. Of this latter type, with the seed in the center of the wing, we have a most ingenious and remarkable example in the twisted samara of the Chinese tree-of-heaven (*Ailanthus*). These samaras are borne in great bunches with each samara on its own tiny stalk. When they release their hold on the tree, even on a quiet day they begin to revolve rapidly upon thir long axis and moving hither and yon like a flock of birds in flight dart away to pastures new. Even after reaching the earth, a gust of wind catching their sails often carries them much farther.

Possibly just to show her independence of a single method, nature has equipped the cluster of basswood seeds with a sail or wing made of a leaf. When the blossoms appear, there appears with them a narrow green wing or bract, which is fastened by its midrib to the common flower stalk for about the first half of their respective lengths. During the summer this broadens and toughens and its tip spreads out at such an angle to the flower stalk that when released from the tree in autumn a whirling motion is set up that most effectually retards the descent of the fruit cluster. Without doubt this is nature's best parachute. Since the number of fruits in the cluster varies, one may wonder whether the angle formed by the bract with the fruit stalk is calculated from the weight of seeds to be carried. One may easily see how very much the wing adds to the seed cluster's buoyancy by simultaneously dropping two seed clusters from a height after the bract of one has been removed. The bractless one drops like a shot; the other very leisurely reaches the earth. The seeds of the blue beech or ironwood (*Carpinus*) are also equipped with a bract, but in this case each seed has its own bract, a three-lobed object, which helps in dissemination, but which appears to be far less effective than the bract of the basswood.

From the changes which are rung on the modified ovary as a source of winged fruits, we may infer that this is nature's

favorite method. She returns to it again in the locust family wherein the ovary is made to serve as a wing for not one, but many seeds. If we open a locust pod just before maturity, we may wonder why the seeds cling so tenaciously to the pod. The seed stalk seems out of all proportion to the needs of the seed. But the use of all this is found when the pods ripen. At maturity they split open like the pods of the common bean, but the locust bean does not drop out of the pod as common beans do. There the two halves of the pod hang on the tree with their seeds clinging fast, until a gust of wind carries pod and all away turning it over and over as it goes. Whether the seeds eventually drop off here and there I have never been able to discover. Many of the pods hang on the tree until the snows have fallen and then falling on the snow crust may be blown for long distances. The locust, however, does not always grow where winter snows are deep, and this trip over the snow was apparently not planned for when the means of transportation were evolved. It may be questioned whether in the making of locust-pods, evolution has been influenced much by the usefulness of the pod in distributing the seeds. The long twisted pods of the honey locust are too heavy to be whirled away by the wind, but they may be rolled over and over after they have reached the earth. But the coffee tree with pods thick and woody and seeds like bullets firmly attached, though built on the plan of the locust pod was plainly never meant for wind distribution.

Still more curious is the fruit of *Sterculia platanifolia,* which Mrs. Bradshaw has recently sent me from California. This produces clusters of ovate ovaries in which are borne two or three seeds as large as peas. When ripe the ovary splits down on the side upon which the seeds are located dividing the seeds so that there are one or two on each edge and forming a shell-like structure like the vanes of an anemometer. In a

stiff breeze this is whirled over and over, even after it has come to earth and losing a seed here and there soon plants the crop.

MOUNTAIN MISERY.

BY CHARLES FRANCIS SAUNDERS.

BY this alliterative title is sometimes called a pretty little evergreen shrub of the middle Sierra region of California, where in sunlit, coniforous forests it often covers immense areas with a dense carpet of dull green, which looks at a short distance like a sown turf. The branching, wiry stems are about a foot high and are clothed with an abundance of finely dissected leaves, amid which throughout the summer an occasional solitary white flower is borne, resembling a strawberry blossom. Like the strawberry, indeed, the plant is a member of the rose family, and is botanically known as *Chamaebatia foliolosa*—a name familiar to readers of John Muir's works, who speaks of it sympathetically in "Our National Parks."

The leaves are so fern-like in appearance that it is said that an old lady of one of the foothill towns, who added to her income by selling pressed flowers to tourists, used to palm off bits of foliage on the uninitiated as fronds of a peculiar fern of the region.

"But why Mountain Misery?" you ask. Upon plucking a few leaves of the plant, you become conscious of an indefinable, pungent odor, somewhat of a cross between that of tobacco and fresh paint. Then you notice that your hands are discolored and begummed with a sticky resin which dots the leaves, and, if you do not observe it then, you will later. Your clothes, wherever they have come in contact with the plant, are liberally smeared with the same substance; so that if they are of a delicate fabric, it will be a nice matter to restore them to their original estate. "So", you think, "misery enough", and deem the plant well named.

Cattle frequenting land where *Chamaebatia* is abundant, are said to get their bells so gummed up with its tarry exudations at times, that the metal no longer makes a sound. Mountaineers often call it tarweed—a generic term, like greasewood, applied in the west to many plants of quite diverse botanical families.

Pasadena, Calif.

OBJECTS IMBEDDED IN TREES.

BY PROF. C. E. BESSEY.

SPEAKING of objects imbedded in trees on page 41 of the October BOTANIST, reminds me of an odd specimen I have had on my table for a month or so. It is a section split from a stem of a lodge-pole pine (*Pinus murrayana*) in which are imbedded several cones of this species. The piece of stem from which the section was split was a foot long and about four inches in diameter at the base, and about three and a half inches at the upper end. In this section, which is not more than one-fourth of the whole stem, there were imbedded six cones, each about an inch and a half long and an inch in diameter. When the stick was cut, the cones were almost covered with wood, only their tips being visible through the small holes which still remained. Had the growth of the wood not been stopped, the cones would have been completely covered.

The lodge-pole pine is remarkable for the tenacity with which its cones hang on, according to Sargent, "usually remaining closed for twenty years." These cones in my specimen remained so long that the wood grew over and enclosed the cones. A careful count of the annual rings at the base of the stick showed fifty rings, so that it is certain that these imbedded cones must have formed about fifty years ago. Whether the seeds (which are still in the cones) still retain their vitality is quite doubtful.

It is interesting in this connection to mention the fact that when a fire sweeps through a forest in which there are lodge-pole pines, the heat causes the cones to open within a short time after the fire has gone by, and the seeds are therefore on the cleared ground very early. By next year there is a myriad of little pine seedlings on the ground, excluding and smothering out every other thing. I have seen many such exclusive thickets of these young trees in the Yellowstone Park, where this tree is found in great abundance, often to the complete exclusive of not only all other trees, but of every other kind of vegetation as well.

University of Nebraska, Lincoln, Nebr.

COMMON THINGS.

BY M. F. BRADSHAW.

LET no one ever give over the study of botany for want of new material. True, a new plant to examine is the most delightful thing in the world, and nobody but a botanist quite knows all the pleasure of it. But, do we all know all about the everyday flowers of our gardens? Longing to botanize and not being able to get out into the wild country where my heart has been all the spring, I begun to look at the garden flowers with an eye to something besides their decorative beauty. Why not examine them all, just as if I had never seen them before and they were so strange that I must use the key?

Well, the first lot I gathered numbered ten, and by the time I was through with them, looking carefully at every part with the help of a lens, my mind was made up; I would study botany in the garden. Such lovely things I saw. I was filled with delight, and then I learned some new features that I had never observed before. For instance, in the Geranium family. They are among the common things here, and there are now in bloom the zonale, the "Lady Washington", the ivy leaved,

the rose geraniums, the nasturtiums, the oxalis, each of these species in several varieties. I do not know that I ever did examine them all, all through, before; if I have, I overlooked one curious thing. The nasturtium has a spur and it always seemed a very distant relative, since it had to be considered one of the family; but I found a connecting link that made it as near as second cousin to the zonale geraniums. The pelargonium comes between the two, its general effect being most like the geranium, but in detail there are the two upper petals larger and with lines of dark color in the throat like the nasturtiums, and it has the spur. I never saw that before, but the key in Gray said it was there, so I looked for it. One sepal is larger than the others and it is prolonged into a spur which is adherent to the pedicel. This was not hard to find when one knew it was there, but surely the other geraniums have no such appendage! Look closely at the slender pedicels; there is a hollow side—a spur really—running down one side nearly to the end. It is in them all, hard to find, almost absorbed, but it is there. Now think of that for a botanist to have missed! Or do I assume too much when I call myself by that honorable name?

How many of us have a picture in our minds of the arrangement of the stamens in the Bignonia family? I have on a pergola *Tecoma jasminoides* and on an arbor *Bignonia venusta,* both perfectly grand, each one willing to take the place and doing its very best for it, and actually would smother the house and us if not kept within their own territory by constant pruning. They are supposed to take turns, the *Bignonia* blooming through the winter months, the *Tecoma* in the summer, though both are in bloom much of the time and there are always some flowers on them both. So I have admired, I have praised, I have loved them; I have given away the flowers and the roots to all who would take. I thought I had fully sounded their depths and that the bignonias were such

dear intimate friends, I knew them through and through. I did not, and now I know I never will, nor will I know any other flower friend any more than just a little way.

Look at the grace of the stamens in *Tecoma jasminoides;* has any other flower hit on anything quite so lovely? And with all the countless blossoms overhead, for years past, I never have seen it till now.

I still want to go to the hills, but I intend to study botany and the garden will be an ample field for me, for I suspect every old friend in it has a secret I can find out, and it is sure to be a charming one.

Orange, Cal.

OUR POISONOUS PLANTS.

BY DR. WM. WHITMAN BAILEY.

OUR native plants, poisonous to the touch, are only two in number. These are the common species of *Rhus,* the *R. venenata* and *R. toxicodendron,* with its varieties. The fruit is variously called "poison dogwood", "poison oak", and "poison sumac." The last is the best name for it, being according to facts. It *is* a sumac. The name dogwood, properly belongs to a very different series of plants, namely, to the cornels, of which *Cornus florida* and bunch-berry (*Cornus Canadensis*) are examples of one type. There is another series—as in the osier dogwood, (*Cornus stolonifera*)—that lacks the ornamental involucre which makes the first two, so beautiful. These cornels are all innocent, but, from confusion of names, are avoided by many as presumably noxious.

Rhus venenata grows in swamps or moist places, and is a small tree, from eight to twenty feet high. It has a smooth gray bark and very large, handsome pinnate leaves, the leaflets entire, glossy, and acute. In autumn they color gloriously and with a great variety of tints, scarlet, crimson, yellow, and maroon. Red is the favorite shade, and even when the leaflets are green, the rachis is red.

So splendid are these leaves, that every year, they, Siren-like, lure many victims, if not to destruction, at least to much misery. For it is a serious thing to be poisoned, and the susceptible are never exempt. Indeed, one poisoning seems to render them more liable to another. Certain persons are affected by mere proximity to the shrubs. The smoke of the bush when burning will poison others. It is said, indeed, that a few people cannot handle gum copal, or anything coated with shellac, the copal being made from an oriental *Rhus,* which is poisonous.

Many remedies have been suggested or tried. Chlorinated soda, applied as a wash is good. A quick application of alkaline water, or a weak solution of alcohol may be effective. A regulation of the diet, too, is of advantage. The poison is probably acid and needs to be washed off or neutralized. Experience shows the plants to be especially dangerous when in flower, or, at least, this is a very common belief. Elaborate experiments have been performed at the Harvard Medical School and elsewhere, to determine the nature of the poison and its best treatment.

Rhus venenata is much more dangerous than *R. toxicodendron,* but is is a curious fact that many persons, like the writer, are exempt from either. The great botanist, Michaux, however, warns people, that even those who had for half a life time considered themselves exempt, might finally succomb. This may depend upon changed conditions of the system. As is well known, there are certain persons who cannot handle strawberries or wild carrot. Fortunate is the botanist who, like Gallio, "cares for none of these things."

The flowers of both our poisonous species of *Rhus,* come early in the season. They are greenish, and not unlike those of the grape, to which the family (*Anacardiaceae*), is nearly allied. The fruit in the poison species is gray, while innocent sumacs have red berries.

The poison ivy is often mistaken for the Virginia creeper or woodbine (*Ampelopsis quinquefolia*). From this it may be distinguished by its three leaflets, of irregular outline, its root-clothed or hairy stems, and gray berries. We say gray. They are rather a sickly yellow. *Ampelopsis* climbs by tendrils which are attenuated stem axes. Each tendil is capped by an adhesive disk or cup. The poison ivy, on the other hand, clings by its aerial roots.

In cross section *R. toxicodendron* shows eccentric rings, the pith lying close to the less-exposed side, or nearest the supporting object. The leaves color gorgeously in autumn, assuming shades of orange, yellow, scarlet, or crimson. Flung high over some elm or evergreen, the trails are extremely brilliant.

Both of these dangerous plants are all two frequent. State laws or municipal ordinances are powerless against ivy. In the city of Providence, it prevails on some of our principal streets; one sees it everywhere in Newport and about Narragansett Pier. Indeed, near the salt water resorts it seems to especially thrive. No one can tell how many persons annually suffer from it. Over and over again the writer has pointed out the two shrubs, or written about them in the public prints, but no action appears to be taken against them. Like moths to the candle, the victims return.

So much for our own tactile poisons. There are those who proudly claim to be poisoned by parsnips even. Science does not deny this, but waits for proof. Is it not true, that a few (white) people are made sick by melons; yet shall we forswear neither the luscious cantaloupe, nor the succulent watermelon It is only right to mention the plants that are poisonous in the other ways than by touch. Of these there are many. Some buttercups are sharply acrid; the monkshoods or aconites violently poisonous; the fox-glove also; while the leaves and rootstocks of mandrake (*Podophyllum*) are to be

avoided. This last plant, also known as may-apple is very common in the Middle States. In early spring it sends up from its vigorous creeping rootstocks, a series of bud-crowded stems. Those that are to bear flowers have two leaves, between which is the spherical flower-bud, which as it prepares to open, droops and hides under the umbrella-like foliage. The barren stems bear but one peltate leaf, ample and handsome. The snow-white, waxy flower is large and showy. It is succeeded by a juicy sub-acid berry, which gray speaks of as being "eaten by pigs and boys."

The bloodroot as its name implies (*Sanguinaria* in Latin also), has a murky, gory-looking fluid in its rootstocks. It is acrid and used to some extent in medicine; not dangerous probably.

Buckthorn is a very common shrub or small tree in New England. It bears clusters of black cathartic berries violently purgative. No plant of the *Leguminose* at the East, seems actively poisonous, but on the plains of Indian Territory, Kansas, Nebraska, etc., grows an *Astragalus,* the "Loco" or "crazy plant", very dangerous to cattle and horses. The wild senna (*Cassia Marilandica*), can be used much as is the officinal drug senna. The two little sensitive plants, *C. chamaecrista* and *C. nictitans,* probably have similar qualities.

As regards the Rosaceae, we would suggest that it is not safe for everybody to eat too much of the leaves and bark of wild cherry. It is hydrocyanic acid which imparts the toxic quality to this plant and to the leaves of laurel or *Kalmia.*

We must now speak of a group of plants which contain many poisons, as well as many edible plants and condiments. It is the parsley family or Umbelliferae, known, as a rule, by their umbrella-like flower-clusters of white, yellow, or lavender blossoms and by their peculiar fruits. It is by their fruits, indeed, that they are distinguished from each other. The edible plants of the family are parsley, parsnip, celery, cori-

ander, lovage, caraway, anise, etc. Some of these, even in the wild state, are active poisons. It never does to fool with them. The pronounced poisons are the swamp or water-hemlock (*Cicuta maculata*), very common, the true hemlock (*Conium maculatum*) occasional and known by its mouse-like odor, spotted stems, white flowers and parsley-like leaves; and fools parsley, (*Aethusa cynapium*), sometimes found in waste places. The last two are horribly dangerous, but we say again in regard to them all, be careful. Do not try experiments with them, if they invite eating. *Conium,* by the way was the "Hemlock" of classic history used to elminate undesirable friends or too active politicians.

Lobelia inflata, Indian tobacco, is a "noted quack medicine", and generally reputed poisonous. However, I knew a reputable doctor of the old school who always maintained to the contrary and cited how he had used it with impunity. It will be recalled on the authority of Darlington that quacks called the cardinal flower "highbelia" in distinction from "Lowbelia", the Indian tobacco!

In Ericaceae we have the mountain-laurel, (*Kalmia latifolia*), and the smaller *Kalmia augustifolia,* or "lamb-kill", about the noxious properties of which there is little question, I have been told that an infusion of the leaves of either of them forms a good fly poison. I have never tried it,

The foliage of *Andromeda Mariana* is used in a similar way. Then there is the bear-berry, (*Artostaphyllos uva-ursi*) employed in medicine. It literally carpets portions of Rhode Island, and with its pink urn-shaped corollas is as pretty nearly as *Epigaea.*

The nightshade family, *Solanaceae* is one of which the botanist is always shy. It boasts among its useful plants the potato, tomato, egg-plant, cherry-tomato and tobacco. The last, useful and grateful beyond question, has also to be classed as noxious. Like some others

of Nature's benefactions, it is to be employed in moderation. The true nightshade, (*Atropa belladonna*), we do not have in America, unless as a rare escape. I have myself never seen it growing but twice, but the bitter-sweet nightshade is popularly called the deadly, and is especially dangerous to young children, owing to its brilliant, red, almost translucent berries, and pretty, blue, potato-like flowers. The plant spreads over stone walls, fences, and copses, and is highly ornamental. Its little cousin, the black nightshade, (*Solaum nigrum*) is often seen in old farm yards. It has dark berries.

Much more dangerous then either *Solanum Dulcamara* or *S. nigrum,* is the thorn-apple or "Jimson weed", (*Datura stramonium* and *D. tatula*). These rather bushy, but still herbaceous plants, strikingly ornamental and hence much used by artists and designers, are found on ash-heaps and in waste places throughout the Union. They are said to be of tropical origin. The first has large white, funnel-form and convolute corollas; the second is in every way smaller; and with violet-tinted flowers. Both have a coarse evil smell, yet every year deaths from them are reported. The seeds, treated in alcohol afford a solution, which according to whether viewed by reflected or transmitted light, is green or a rich red. This plant, handsome as it is, always indicates a lack of thrift, and on that account as well as its dangerous nature, should be uprooted wherever found.

As a rule it is well to avoid chewing any plant endued with a milky juice; hence, I should be suspicious of uncooked stems of milkweed or dogbane. The asclepiads in a very young state, however, are used in some places as salads. *Vincetoxicum nigrum* a near relative of these, a plant with small livid flowers, and a repellant odor, a sprawling climber, escapes now and then, and is abundant at West Point, N. Y., and Cambridge, Massachusetts.

If pokeweed (*Phytolacca decandra*) is not poisonous, all the better, for its fine strings of ink-filled berries are very

tempting to children. They certainly have a dangerous look, but so far, though often in stress, I have not been compelled to eat them.

The Euphorbias are all poisonous with acrid juice, generally milky. We have many of them, especially at the west where they become handsome, like the well-known "snow-on-the-mountains", (*E. maculata*). The "tread-softly" (*Cnidosculus*) of the Southern States stings worse than any nettle or jelly-fish. This is saying a good deal. Croton and castor oil belong to this family. Common nettles (genus *Urtica* and some nearly related wild genera), poison by means of actual stinging hairs, provided with a poison bag. It is a suggestive bit of thought to reason out, how, by selection, such a provision has come about, as I am disposed to think it did.

Every one knows the acridity of the corm of Indian-turnip or Jack-in-the-pulpit, (*Arisaema triphyllum*). It is a lump of caustic, say those who have tried it. I once saw it played on a leading man in one of our college classes. He knew almost everything but his class-mates, by making him bite Jack, gave him a new and active sensation.

Veratrum viride or white hellebore is usually spoken of as our most deadly poison. It is often known as sneeze-weed and can be recognized in early spring by its very handsome, ample, plaited and intensely green leaves. The plant grows in low grounds with skunk-cabbage, another acrid plant. The roots are the toxic parts of hellebore. The plant has a place in the pharmacopeia, but is better known as a vermifuge.

Brown Univ., Providence, R. I.

SUGAR.

CANE sugar, sucrose or simply sugar, as it is known to commerce and in the household exists dissolved in many vegetable juices. It is found in the stems and roots of all grasses especially in the sugar cane and sorghum; in fleshy roots as the beet, carrot, turnip and sweet potato; in the sap

of trees as the date palm and sugar maple; in almost all sweet fruits and in the nectar of flowers; but only in a few of these is the proportion of cane sugar large enough to make profitable its separation from the other substances which these juices hold in solution.

The manufacture of sugar as at present known is an art that has developed from crude beginnings. Sugar is a staple article of food, just as is bread or meat, but few people realize that unlike meat and bread it has been a staple food for but a few generations. Only indeed in the last half century has it been produced in such quantities and at such a price as to bring it within the reach of all classes of people.

Sugar from the sugar cane was probably known in China 2,000 years before it was used in Europe. When merchants began to trade in the Indies it was brought westward with spices and perfumes and other rare and costly merchandise and it was used for a long time exclusively in the preparation of medicines. An old saying to express the loss of some thing every essential was "Like an apothecary without sugar." Greek physicians several centuries before the Christian era speak of sugar under the name of "Indian salt." It was called "honey made from reeds" and said to be "like gum, white and brittle." Not until the middle ages did Europeans have any clear idea of its origin. It was confounded with manna or was thought to exude from the stem of a plant where it dried into a kind of gum.

The sugar consumed in this and other countries up to 1850 was nearly all derived from the sugar cane, but at the present time two-thirds of the sugar crop is from the sugar beet. It would once have seemed incredible that the kitchen garden should furnish a rival for the "noble plant" that had made the fortunes of Spanish and English colonists, but the cultivation of the beet has in one generation shifted the center of the sugar industry from the tropic to the temperate

zone. Marggraf a chemist of Berlin first discovered in 1747 that beets with other fleshy roots contained crystallizable sugar identical with that of the sugar cane. From the 5 per cent as found by Marggraf the sugar beet of good quality now contains 15 per cent and more, 12 per cent being considered necessary for profitable manufacture.

The sugar maple of North America is also a source of sucrose, the tree being tapped in the early spring to obtain the sap as it flows upward. The sap was formerly simply boiled down in open kettles and used as molasses, or the evaporation was continued until the sugar crystallized and the brown maple sugar was obtained. Five gallons of sap yielded about one pound of sugar. In 1894 the amount of maple sugar produced, including that upon which no bounty was paid was over 7,500,000 pounds.—*From Farmers' Bulletin No. 93, U. S. Dept. Agriculture.*

NOTE AND COMMENT

The Pig Lily.—Africa is the home of the calla lily, but it is not held is as much esteem at home as in our part of the world. A missionary from South Africa recently told the editor of this magazine that in that country it is called pig lily, because pigs are fond of the bulbs.

Toxic Pollen.—There seems to be little question but what hay fever is caused by the pollen of various plants. The common ragweed (*Ambrosia artemisiaefolia*) is regarded, probably with justice, as the chief offender, but according to *Scientific American* one hundred and fourteen plants are known to have toxic pollen. Normally these affect the sufferer only when the flowers that produce them are in bloom,

but it is quite possible to produce the symptoms of hay fever in the winter by snuffing up one of the toxic pollens.

Production of Cocoa.—Fifty years ago, the inhabitants of the United States seem to have known very little about cocoa and chocolate. The consumption of this food averaged about three-fifths of an ounce for each person. Since then the use of cocoa in the United States has become twenty times as great. In 1903 it is estimated that we used more than two hundred and eighty million pounds.

The Sunflower and the Sun.—A writer in a current natural history magazine scouts the idea that the common sunflower constantly keeps its head of flowers turned toward the sun. It is quite likely that a plant whose flower heads are as large as those of the garden sunflower would find it difficult to turn them daily through half of a circle, but the smaller and lighter species of sunflowers seem to do so.

Orientation of Solomon's-seal.—One can hardly fail to notice in a patch of Solomon's-seal (*Polygonatum giganteum*) that practically all the fruiting stalks bend in the same direction. Further observation will be necessary to determine whether the direction in which the stalks bend is due to light, wind, or warmth. Observations on this point will be welcome. In sunny swamps the fronds of the common chain fern (*Woodwardia Virginica*) usually face the sun, and many a colony of sunloving plants on the borders of woodlands face away from the shadows, but the Solomon's-seal is ordinarily a shade plant and possibly some other explanation of its turning must be found.

An Unfortunate Sunflower.—There is an old story of a country boy who caught an owl and finding that the bird could apparently turn his head completely around, was able to wring its neck by the simple expedient of attracting its attention and then walking around its perch several times. A

parallel to this comes from the Arctic circle where it is said a seed of the common sunflower was planted. All went well until the flower blossomed. At that season, due to the latitude, the sun does not set at all but circles around the horizon for the entire twenty-four hours of each day. The sunflower, true to her instincts continued to face the sun and soon twisted her head off.

Varying Odor of the Fir.—Five years ago I spent the summer in the mountains botanizing. At the time I noticed that the firs (*Abies concolor* var *Lowriana*) at times gave out a peculiar strong odor. This summer I have been camping among the firs, and noticed that when there were indications of rain in the atmosphere the trees throw off this odor more than at any other time. I studied them closely for seven weeks. I noticed at times I could not detect it at all, while again the air was filled with it. I could not smell it as strong if I was close to the tree as when I was 15 or 20 feet from it, and it differed from the odor the trees have all the time. I would like to know if others have noticed this peculiarity and can explain it. [It is a peculiarity of the human constitution that most odors are more perceptible when the air is moist. Roses which in the damp air of the greenhouse have considerable fragrance, appear to have much less when transferred to the drier air of the living room. A great many night-blooming plants are fragrant, but this fragrance is more noticeable to us and possibly to insects by reason of the damp air of evening.—*Ed.*]

Dissemination of Osage Orange.—With most fruits and many seeds, it needs but a glance to discover the means by which they are dispersed. The wing on the maple fruit, the ash key, the bract on the basswood peduncle, the pappus on the thistle achene, the silky awn on the clematis, can mean nothing but wind distribution. In the same way the burdock and beggar ticks show that they were intended to be distributed by catching into the fleece of animals while the

berries and drupes indicate that birds and small mammals are the chief agents in their dispersed. What agency the Osage orange had in view when its great orange-like fruit was evolved is something of a mystery. Its sticky latex and disagreeable taste apparently repel all grazing animals, while its weight is so great that it can be moved by such animals only. Owing to its shape it might roll for some distance when dropped from the tree, or it might float away on the water. Our readers are invited to offer other explanations.

The Osier or Basket Willow.—The basket willow is properly catalogued among American farm products rather than among the products of the forests for these willows are grown like other farm crops. According to the *Tribune Farmer* the largest willow farm in the United States is at Clyde, N. Y., near the city of Rochester. It is fifty-five acres in extent. Low moist land is best for such farms and once set, the willow plants last indefinitely. The willows are cut to the ground in the fall and the next spring a new crop of straight slender branches grow up. From three to eight tons of cuttings are produced to the acre, the price at present being about $18.00 a ton. Most of these willows are used in basket-making and for similar work, but in the grape-growing regions large amounts are used for tying grapes. Small willow farms are familiar sights in the grape regions of New York State. A field of willows in full growth looks from a distance like a field of hemp.

Delayed Germination.—Most seeds germinate shortly after they are planted. Usually, in our climate, they remain dormant during the winter following their dissemination, though not a few begin to grow in autumn and pass through the winter as seedlings. Thus has arisen a group of plants known as winter aimuals. These spring up in autumn, flower the next spring, and die before the summer is well under way. The true biennial devotes the first year of its life to storing up

plant food and the second year to flowering, but by planting the seeds of such plants in autumn, we may induce them to produce seeds before the next autumn or within a year. Contrasted with the behavior of these seeds is that of a few others, which not only do not germinate the year following the one in which they were produced, but remain dormant for many years—possibly twenty years or more. The cause for this delay in germination is not very plain and Mr. William Crocker of the University of Chicago has been investigating the subject. In the *Botanical Gazette* for October, some of his conclusions are published. In general he finds that a delay in germination is due to the seed coats which so completely shut out moisture that the embryo cannot get enough of it for growth. This is true of the Indian mallow (*Abutilon avicennae*), only a small per cent of whose seeds will grow after weeks of soaking. If the seed coats are broken, however, practically every seed will grow in a very short time. Essentially the same conditions govern the germination of our common plantains (*Plantago major* and *P. Rugelii*) the shepherd's purse (*Capsella bursa-pastoris*) the pigweed (*Chenopodium album*) and the cypress spurge (*Euphorbia cyparissias*). A few other seeds will absorb water readily, but the seed coats are so impermeable to oxygen, another essential, that until the seed coats are injured the embryo cannot grow. In the fruit of the clot-bur (*Xanthium Canadense*) there are two seeds of different shapes, one above the other. The lower one of the two usually grows the first year, but the upper seed, remains dormant for long periods of time, waiting for the necessary oxygen. *Axyris Amaranthoides* is another plant which produces two seeds of different shapes, but these are on different parts of the plant, instead of in the same bur. Owing to a difference in the thickness of the seed coats, one shape of seed will germinate at once, while the other remains dormant for years. Among our common hawthorns (*Crataegus*) the delay in germination appears to be due to some peculiarity of the embryo, which is not understood at present. It is a question whether the delayed germination of seeds has been evolved by plants to give the seeds a distribution in time, or whether it is an inherited tendency of no special value to the species.

EDITORIAL

Such is the confusion existing in botanical nomenclature that no matter what rules are adopted for naming plants, some pretext will be seized upon for getting in a few new names. The recent International Botanical Congress which met in Vienna, adopted a set of rules that are apparently far in advance of any others looking toward a stable nomenclature, but even these, it seems, will make way for numerous changes. In the early days of botany, even the leaders had a very shadowy conception of species, a still more hazy notion as to generic relationships and an absolute lack of honesty in the application of plant names. If the names given to a plant by its discoverers did not happen to please the tastes of the next one who wrote of it, he did not hesitate to give it a new name. Often a dozen or more different names were given the same plant unintentionally by workers in different parts of the world who had not the facilities that we have for ascertaining what is going on in the science. But whether intentional or unintentional the multiplicity of names has made a fine chaos out of which each modern botanist thinks he can erect an ideal nomenclatural cosmos if only the rest would adopt his rules. Thus it happens, that innovations are constantly proposed. Although all the world may be unanimous in the use of certain plant names there are plenty of botanists who would adopt new and strange names in place of them simply because the strange ones were given first. That the latter failed to get into use seems to them of no significance.

* * *

For our own part, we are inclined to look upon the name of a plant as simply a convenient means of handling it mentally, and to insist first of all that it be stable and unchanging. What earthly difference does it make *what* a plant is called, so long as the name is one that everyone recognizes? And yet these

dealers in nomenclature ask us to change these names because some long-ago dead-and-gone botanist failed to receive credit for the names he made. Alas, for the sincerity of the nomenclaturists' professions, it is noticed that a change is seldom made unless somewhere in the shake-up his own name is attached to the new specific combination. Simmered right down to fundamentals we are asked to change a lot of names that a few botanists may be embalmed in print in the author-citation of species. Some of the most active workers in the field of nomenclature have contributed practically nothing to the science of botany.

* * *

The common names spice-wood and sassafras, are known to nine-tenths of the people who have attained their majority in the region where these two plants grow, but we are absolutely certain that not nine-tenths, nor even one-tenth of the plant students know the scientific names of these same species. No longer are they entitled to those abominable "duplicate monomials" *Benzoin Benzoin* and *Sassafras Sassafras* nor yet to the more familiar appellations of Gray's Manual *Lindera Benzoin* and *Sassafras officinale.* Dr. B. L. Robinson in *Rhodora* for October has dug up a new name for each and according to the Vienna rules we should now write *Benzoin Aestivale* and *Sassafras Variifolium.* We say "should write" advisedly for whether this magazine will do so depends upon the amount of evidence forthcoming that these names are not to be changed again. The new name for the spice-wood is just as expressive as the old one and that for the sassafras is much more appropriate than any the plant has borne recently, but if these Vienna rules, under which the plants were renamed, will permit of another change in a few years, then we are going to wait for the last change even if we die before it comes, as in all likelihood we shall.

There is just one way to get a nomenclature for American plants that will not change and that is to adopt a set of names by agreement. Let the Harvard University men issue that new edition of Gray's Manual that we all know is being incubated and let them issue it in comformity with the Vienna Code. And then let us call a halt to name changing. Let us adopt the names there used and let us stick to them no matter how many musty names are subsequently exhumed at New York and Washington. All we ask is for a collection of vowels and consonants that will forever represent a certain species. To adopt the course outlined above would deprive a lot of "botanists" of an occupation, but it would advance real botany immensely and that is what we are after. And now, shall it be *Sassafras Variifolium* or shall it be *Sassafras Sassafras officinale?*

BOOKS AND WRITERS.

The publishers of Parsons' "Wildflowers of California" inform us that the stock and plates of this work were all destroyed in the fire that followed the San Francisco earthquake. It is to be hoped that another edition may be brought out.

In order to meet a more popular demand, the publishers of Mrs. Elisabeth Hallowell Saunder's publication of color prints of "California Wild Flowers", recently noticed in these columns, have issued a special edition this autumn, consisting of two sets of six flowers each, instead of the one set of a dozen flowers as originally. The sets of six retail at 50 cents, and may be had by mail from Sanborn, Vail & Co., Los Angeles, California.

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VOL. 11 DECEMBER, 1906 NO. 4

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Issued on the 15th of each month except July and August

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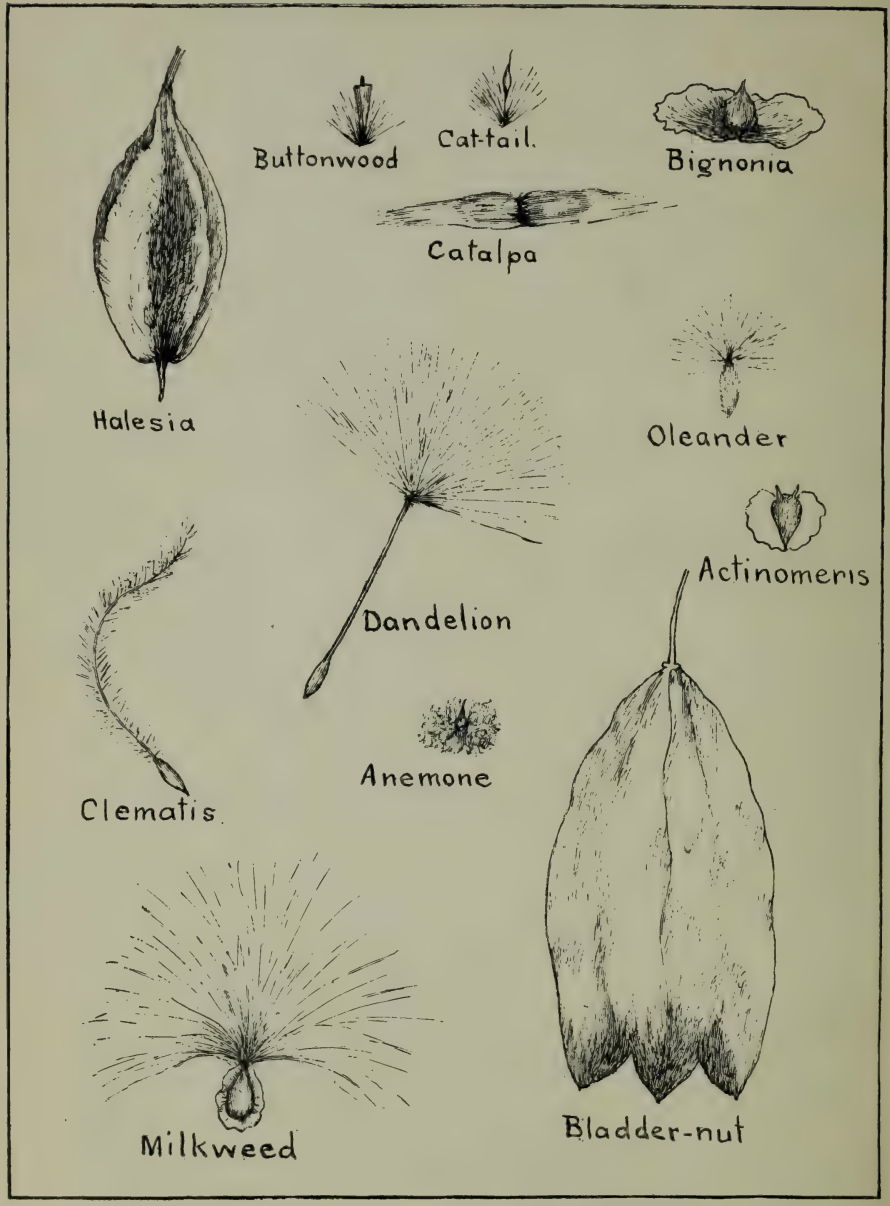

WIND-DISTRIBUTED SEEDS.

THE AMERICAN BOTANIST

VOL. XI. JOLIET, ILL., DECEMBER, 1906. No. 4

WIND-DISTRIBUTED SEEDS.

BY WILLARD N. CLUTE.

ALMOST as soon as there were seeds, various agencies and conditions began differentiating them and perfecting their devices for transportation. Undoubtedly the wind was first impressed into the service of carrying seeds, if, indeed, it did not originate the whole custom. The first seeds were, in all probability, without means of any kind to aid them in seeking new territory, but even the slight chance of being moved some distance that the first faint wing-like expansion of a seed gave to it must have resulted in favor of such seeds in the long run. Thus was originated a series of modifications that have extended to our own time—modifications that Nature is as keen about now as ever and which she takes as much pains now to keep up to their highest efficiency as when she first began.

It is a far cry from the first small seeds blown about by the wind to the present day seeds with their wonderful modifications for sailing. Many seeds seem never to have got beyond the first stages of the process and to this day rely upon their small size and light weight to secure transportation.

Very early, however, two main lines of evolution for wind-borne seeds seem to have been selected. On the one hand, this evolution has led to the great group of winged seeds in which the wing not only acts as a sail, but in various ways retards the fall of the rather heavy seed to the earth; on the other, we have a group as large or larger in which the seeds are so light that the most fragile of silky parachutes is capable of carrying them long distances.

It is interesting to note the differences in the way Nature looks after these two groups of seeds until they are mature.

The true winged seeds are known to be such at the start; they are hung up where all may see. Not so, however, with the parachute seeds. While they are ripening there are few evidences of the fact about. The uninitiated could never single out from among the ripening seed-pods the caskets containing these treasures, until suddenly some fine day the pods open and the secret is out. The silky hairs, compactly folded into the smallest compass while growing, are now gaily spread and with the first breeze the seed is launched.

Not all winged seeds, we hasten to say, are locked up in seed-pods until mature, but a great many of them are. As with the winged seeds, Nature has various ways of arriving at the same end. Now she modifies a seed-coat into a parachute and again it may be the whole fruit that is thus modified, or possibly the calyx or the style. Then too, there are seeds that appear undecided whether to be winged seeds or parachute seeds. Such a one is the catalpa, which all winter long lies snugly hidden in the long cylindrical pods hanging on the tree. When, in early spring, the pods split into two long valves and the seeds come tumbling out we see that they are winged for a short distance and then fringed with silky hairs. The trumpet creeper (*Bignonia*), one of the catalpa's nearest of kin scarcely belongs with the parachute-seeds though it, like them, depends upon its lightness to ensure its transportation.

Sometimes it becomes a nice matter to distinguish a fruit from a seed, and to discover just what part has been modified into the parachute. As thistle-down and milkweed silk float by, we can scarcely believe that one is an entire fruit and the other but a seed. Yet so, it is. The so-called seed of the thistle is really a fruit, and the silky parachute or pappus that carries it is made from what would be the calyx in another flower. The milkweed fruit, on the contrary, is the milkweed pod, and its seeds are carried by a parachute made from the coat of the seed itself. The dandelion belongs to the thistle

class of travellers, but the oleander like the milkweed, has a pappus made from a seed-coat.

The curious spheres of the button-wood (*Platanus*), so familiar to the rambler in winter, enclose great numbers of club-shaped nutlets, each one of which is really a fruit. Their sails are modified from the walls of the ovary. Another plant with fruits packed in a close head is the cat-tail. One has to break into one of these close-packed heads late in the year to fully realize the immense number of seeds it contains. They are all stood on end, as it were, with the tips of the seeds pointing outward. Below the seed, toward the interior of the head, there is a stalk-like structure set with the silky hairs that form the parachute. By many, these hairs are held to represent calyx and corolla. In any event what we have been inclined to call a seed of the cat-tail is really a fruit.

One of the most interesting of the devices for being carried by the wind, because of its unusual origin, is found in the common wild clematis. Here it is the style that has become feathered for transportation. The whole buttercup family, to which the clematis belongs is noted for including its style in the fruit, and in the anemone, this is to be seen though the short woolly hairs that clothe its fruits are outgrowths of the ovary.

As a general thing wind transported seeds are adapted to sailing in some way through the air. Some, however, like the bladder-nut seem intended to be rolled over and over on the ground. There are those who believe that the three water-tight compartments of the bladder-nut point to its adaptation for floating on the water, but the unusual lightness of its inflated pod seems to place it with the seeds distributed by wind. The fruit of the silver-bell tree (*Halesia*) seems to be another of like character. As for the fruits of the parsley family and many of the composites like *Actinomeris,* these are really winged seeds that bridge at another point the gap that separates winged seeds and parachute seeds.

"PERUSIN'" THE "PENNYRILE" COUNTRY.

BY SADIE F. PRICE.

IN the autobiography of the art critic, Hamerton, he mentions that he once had a scheme for travelling in Egypt and laid it before Mr. Ruskin, who said, "that he avoided travelling in countries where he could not be sure of ordinary comforts, such as a white table-cloth and a clean knife and fork; "still," he added, "I would put up with a great deal of inconvenience to be near a mountain." It is this love of Nature that one must have to endure the discomforts of an excursion through the "ridge country" of southern Kentucky. The State is divided into four parts, known in local parlance, as the blue-grass and the bear-grass countries, the "penny-rile" and the Purchase. Though the people of the blue grass" may speak disdainfully of the rugged hills and knobs of southern Kentucky,—the "penny-rile",—yet it has a charm and interest for the botanist and the lover of Nature that more cultivated farm-lands and level stretches of even the beautifuul blue-grass, cannot give.

With "a comrade neither glum nor merry" I made a botanical collecting tour through this country some years ago, seeing much of its caves and cliffs, and its quaint people,—a type by the way, quite as interesting as their much-written-about brothers of the east Kentucky and Tennessee mountains. Our way before reaching Green River led over a long stretch of turnpike, then a rock incline until we reached the sandstone ridge. We crossed many little streams,—one of them dark, with asphalt in the soil. A country church bearing the inscription:

NEW
BETHEL BAPTIST
CHAD. 1880

which, no doubt, translated, would read *Baptist Church, Anno Domini, 1880,* stood in an avenue of tall old sycamores, whose

silver trunks were festooned with the flame-colored blossoms of the trumpet creeper,—the floral emblem of Kentucky.

After leaving the main route we entered a rough country road that passed beneath the edge of a large rock projecting far over a cave entrance. As we approached, the cave opened dark and weird before us, and the road was in deep shadow under the immense chestnut oaks and beeches that bordered it. A number of wagon wheels leaned against the wall of rock. These suggested that they were possibly the remains of accidents that had occurred on this rough, rocky road; but we found on coming nearer,—and one really does not expect to find cliff-dwellers in Kentucky,—that there was a blacksmith's shop under the projecting rock, and that a family made their home in the cave!

When we reached our first stopping place, and made arrangements for board, including the services of a "small boy" to act as our guide over the hills, we saw the eyes of our African driver grow big with wonder and surprise; for there is nothing the town "darkey" has more contempt for than the country "white trash" as he dubs them. As he glanced at the head of the family, his many shoe-less children, and the log cabin in the back-ground, he exclaimed: "Y'all ain't goin' to stay heah by yourself is you?"

A feeling of sadness came over us as we watched our driver turn the horses homeward and we were left in the wilderness, may miles from a railway. Checking, however, any thoughts of the flesh pots we immediately started on a collecting tramp—a sure cure for any of the worries of life—and were soon absorbed in its pleasures. We were prepared to rough it, so were not surprised that our room was of unplaned and unsealed boards. A weed grew up through the floor, a foot or more above the boards. There was no fastening on the door; a chair with the water-bucket on it answered as a bolt at night. The bed, with only one sheet, was our one

piece of furniture. We could boast of only a half ownership of the two chairs, since they were ours until meal-time, when we were expected to carry them out on the porch where we ate.

The fare was plain and coarse, the breakfast and supper at least; our noon-day meal in the woods each day, consisted of fruit and the remains of the lunch brought from the house. Though these meals at the house were anything but enticing, yet we put up with the discomforts of everything gladly, as we had the mountains with us. I shall not soon forget those early morning breakfasts at "sun-up" when we heard the birds at their matins,and watched the dew-drops that transformed the homely weeds about us into things of beauty; or on cloudy mornings watched the fog clouds rise above Green River. In the evening, too, we sat here after tea to see the sun set and the great chestnut trees on the hill grow black against the sky, only their pendant clusters of blossoms giving them a touch of light here and there, while the whip-poor-will's call came to us from the rock hillside near.

The picturesque little creek of this locality,—a mere brook in dry weather, with its banks covered with laurel,—is called Ivy Creek, the local name for the laurel (*Kalmia latifolia*) being "Ivy." Laurel is a rare plant in this part of the state and is only found along this Green River ridge, straying down from the mountains of east Kentucky, where it is common. Three species of huckleberries grew on the hills, while under the cliffs ferns grew in the greatest profusion.

"That bonnie road
That winds about the fernie brae,"

its borders "knee deep in ferns, half-hid in flowers" was a never-failing delight to us. The cinnamon fern, the spinulose and marginal shield ferns, the delicate lady fern, the more common maiden-hair and others that delight in deep shade and moisture grew here, while the face of the sandstone cliff was dotted over with masses of the delicate maiden-hair spleen-

wort. But the gem of all was a mass of the rare filmy fern (*Trichomanes radicans*). Far under the cliff, where the rocks were dripping with moisture and where the sunshine never reached the fronds, was the home of this delicate fern. My first view of this interesting plant was a memorable one. A turn in the cliff, a lowering of the head, still lower, down on the knees, then I obtained a full view of the dainty beauty. But to collect it a humbling of my pride was necessary, as I had to cast aside hat and botanical equipment, and crawl under the projecting rock, with scarcely room for head and shoulders to enter. It meant strained muscles and a fresh accumulation of mud on the dress that had already passed recognition, but it also meant a treasure to gloat over!

After packing to take leave for the next collecting field we found that the promised "spring wagon" that was to convey us away, was but a two-wheeled, home-made affair,—half road-cart, half sulky, with no room for baggage for two persons. So the plan of locomotion was rapidly changed and we were rowed up Green River in a "jow" boat. As the water was so clear, and such a bright green,—true to its name,—and the bluffs extremely beautiful, we did not regret the change. The next house we stopped at, a frame and not a log one, in a yard full of old-fashioned red and yellow roses, made us take heart as to accommodations, but a near glimpse of the family, and the rooms soon dispelled all hopes of finding more comfort. We spent two days on the banks of Ivy and Indian creeks, then went in a wagon some twenty-five miles farther north into another country.

The people there were all hospitable and treated us well, but were primitive and quaint in habits and in speech. The members of the dialect society would be pleased at the many obsolete words heard here, many that may be traced to old English and Scotch words. An old woman was "sorry she did not have time to *peruse* these hills" with us. A thicket

of either cane or other under-brush is called a "harricane," this originally meaning a place where a hurricane had once passed. "Ghostes," "postes," "waistes," etc., are common words. The expressions "met up with," "I am a *heap* better," "Where's he at?" "much him up,"—(Make much of him) are also often used. "Thers infi-delity an thers fi-delity, an the infi-dels they don't belive in the Bible, an the *fi-dels*"—but I failed to catch the last of the sentence in this bit of conversation that I over-heard one day between two of these men. There is a sameness in names in that particular neighborhood, and the Jones' and Miller's are so numerous that to distinguish the Bens and Bills of the same family name it is necessary to give them some prefix, hence they are known as Devil Bill Miller and Rum Tom Jones, etc.

I had the courage to go to the home of the first named gentleman and found him, notwithstanding his name, a pleasant, bright-faced man. He, and his daughter, a beautiful, bare-footed girl, that Craddock might have used for a study, accompanied us to the cliff and the picturesque water-fall of seventy-five or more feet that they called the "Fall-over." When we had made the descent and stood under a high shelving rock, the man was impressed with the grandeur of the place, and exclaimed, excitedly, while pointing to the rock above and the immense masses lying below, —"Don't you s'pose all this happened when Christ was crucified?"

The old grandmother, who wore a red bandanna handkerchief over her head and sat smoking a pipe, asked me when I entered the house to "rest" my hat. The girls had bright and intelligent faces, but the woman, the mother of fourteen children, was dull and uninteresting. Among these people I found the men always brighter and more good-natured than the women; because they see more of life, and perhaps, too, because they lead an outdoor life and see much of nature. One of these men, a superintendent of a Sunday-School, said—with

any amount of self-esteem—that he studied plants, too. He gained his information, he said, from Dr. Gunn's book. These houses, with few exceptions, are rarely without this book, often the only one they have. It is considered infallible, and the plants are identified by the plates in the book,—with what degree of correctness one can imagine. To them a plant stands for a remedy for asthma, rheumatism, croup, etc. They were quite disgusted that the medicinal properties of plants formed no part of my studies, for if so, "I might be doing some good." In their gardens they cultivated thyme, lavender, saffron and many old English herbs.

(*To be concluded.*)

SOMETHING ABOUT NAMES.

BY DR. WM. WHITMAN BAILEY.

DO not tremble, gentle reader, this is not to be an article upon the vexed and vexing question of nomenclature. No, it is to string together some thoughts as to "what's in a name?" If a botanical one, a good deal, sometimes in letters—like *Mesembryanthemum,* in which there are sixteen; sometimes in meaning, which may be wholly erroneous or indefinite, as *Menyaanthes* and many others.

A misapplied vernacular name, like honey-suckle to azalea or columbine, gives one a distinct shiver. He has a milder tremor when he hears *Maianthemum Canadense* called Solomon's-seal. Surely it is forgery if not *lese majeste,* to misuse the sign manual of the wise old King—of him who could confine a genie in a beer bottle! Now, there is a significance really pretty in that name when applied to either species of *Polygonatum.* Their rhizomes, by the falling off of a shoot, are marked by a succession of stamp-like scars, as of the impression of a seal on wax. The smilacinas and maianths do not show these, or if so, in less degree.

Pretty names of the vernacular are spring-beauty, grass-of-Parnassus, pyxie, lily-of-the-valley, Snow-on-the-mountains, penny-wort, golden-rod, pimpernel, daisy (the day's eye of Chaucer), primrose (the prime-rose, of early English), "Jack-in-the-pulpit, gold-thread, etc.

On the other hand are a lot of meaningless names in place of which the botanist has more euphonius ones—often, too, more designative. Thus, minny-berry for the sugar-berry, or *Celtis,* buck-bean for *Menyanthes,* "Water-violet for *Hottonia inflata,* a plant of the primrose family; false-indigo, for *Amorpha.*

Old garden names derived from our English home, are many of them deep-bedded in our literature, as betony, agrimony, rue, lords-and-ladies, thistle, ladies-smock, mourning-bride, cowslip, money-wort, honesty, and the like.

I wonder if our readers, by the way, know the fun, as dear old Dr. Gray used to say, he had "tucked into his manuals"? He once pointed out to some of us in the Summer School at Harvard, in those elysian days never to be forgotten, the reading under *Lunaria.* The unsuspicious does not, as modern slang graphically puts it, at first "catch on."

"*Lunaria annua,* common honesty. Not native to the country, but still to be found in old-fashioned places.

Lunaria redeviva, perennial honesty. This is even a rarer sort.

We recall too, in sunny recollections of our old teacher, his comment on the name of *Ailanthus glandulosus,* "called by the Arabs 'the tree of Heaven', but the staminate blossoms redolent of any other odors than those of Paradise." He used to say with a twinkle in that marvellous eye of his, that "a humorous was not inconsistent with a scientific treatment of a subject."

The plants of the table have good, homely, expressive English names, as "carrot, "spinach," "turnip," "caraway,"

"dill," "beans," "millet," "corn;" while the aromatic labiates are a very nose-gay of sweets. Their titles are really musical, and we love them as the bees do the flowers. Read some of them, as thyme, marjoram, basil, balm, dittany, penny-royal, blue-curls, catnip, lavender, sage, and germander.

The whole of this random talkofmine—a sort of thinking aloud, comes from meditating upon the very un-meaning English name of our American plant, *Castilleia coccinea,* formerly called *Bartsia.* It is, as every one knows, usually called scarlet painted cup—in which the adjective alone is a fact. There is no cup or suggestion of one about the flower. The long, narrow, labiate flowers, indeed, are not considered. It is the showy, rather wedge-shaped, flat bracts that atract attention. How much better the Western name for another species, even more brilliant than ones, which travellers to Colorado and Wyoming will recall—"the Indian's-paint-brush." That it looks like, with its bracts, more or less laciniate and daubed with georgeous vermillion. I have thought, too, that the name given here at the East to the comparative new immigrant *Hieracium aurantiacum,* of Diana's paint-brush is significant and worthy.

Brown University, Providence, R. I.

BOTANY FOR BEGINNERS.—XXVI.

Order 10.—Orchidales.

THE Orchidales represent the very highest forms of Monocotyledonous plants. In them the zigomorphic type of flower occasional in the Liliales and usual in the Scitaminales becomes the fixed and almost universal pattern. The epigynous form of flower, too, becomes the unvarying one, while in the Liliales it is only noticeable in a few sections like the irises and amaryllids. In the Scitaminales, which stand between the Liliales and Orchidales, we often find only one or two staments functional, but the other stamens, though

transformed into petal-like organs are usually present. In the Orchidales, however, the reduction is even more complete, for often no trace of the missing stamens are to be found. Aside from these differences the chief thing that distinguishes the Orchidales from their nearest of kin is the character of the seed, orchid seeds, as many may remember are extremely small and light, in fact the smallest seeds in the world are found among these plants. Not only are they small, but they are very poorly developed and do not show the compact and differentiated embryo common to the highest types of Dicotyledons. The embryo consists of but a few cells in which the cotyledon and plumule are not distinguishable and this in enclosed in a remarkably loose thin seed coat. Because of the small size of the seeds, the Orchidales are often called in old books the Microspermae. In most of the species the seeds are without albumen, but this character, according to Rendle does not hold throughout the group.

The orchid flower is noted for the variation in form presented, and yet so unvarying is the fundamental structure that nearly all of the six thousand species are placed in one great family the Orchidaceae. It might puzzle even a good botanist to name the other family that with the Orchidaceae forms the Orchidales. Nor would he, unless familiar with tropical plants, be likely to recognize species of this other family or to imagine them near of kin to the orchids for curiously enough most of them have actinomorphic or regular flowers. It seem an anomaly to group plants with regular flowers among the orchids, but the character of the seeds in both families makes it necessary. This second family is the Burmanniaceae. Most of its sixty species are leafless saprophytes living in the decaying vegetation on the floor of tropical forests. A few are gren plants living in savannas and two species extend far enough north in the United States to get mentioned in our Northern manuals. Some of the Burman-

niaceae show the lily-like character of six stamens. Unlike the orchids the seeds of this family often contain endosperm.

It is the orchid family we usually think of when the Orchidales are mentioned; and well we may, for in point of variety form and color the flowers yield to no others. Some are noted for their bizarre forms and often resemble bees and other insects, others exhibit such beauty of color as to make them the most sought after of flowers, still others exhale delightful perfumes, but few are economically valuable to man with the single exception of the vanilla plant from whose pods the well-known flavor is obtained.

The great majority of orchids are inhabitants of the tropical forests where in common with other herbaceous plants they adopt an epiphytic life and thrive on the trunks and branches of trees. As the species extend toward the poles, they gradually descend to the earth. All the orchids of temperate regions are terrestrial, and practically all of them have the geophilous habit, that is, like the lily-worts, the life of the plant retreats to some underground rootstock, corm or tuber at the approach of cold weather. No less than three different kinds of roots have been distinguished in orchids. First there are the true earth roots,again there are roots for food storage and lastly there are aerial roots. Of these latter three varieties have been pointed out, namely roots for climbing, roots for absorbing nourishment from the decaying vegetation on the tree-trunks and the true aerial roots with a thick outer cortex designed to absorb rain, dew and the moisture of the air. All the orchids are herbs, seldom more than a few feet high, but in one tropical genus (*Sobralia*) they are erect and reach a height of nearly twenty feet. Many climbing forms occur, the vanilla being of this type.

Most of the orchids store food in some way. The terrestrial species usually store it in underground parts, but tropical species form curious green storage organs, called

pseudo-bulbs, which in reality are thickened aerial stems. These may occasionally reach the size of a large cocoanut. Some of the terrestrial species, like their allies of the Burmanniaceae are saprophytes, and still others are underground parasites, stealing part of their food, at least, from the roots of other plants. A few species have set up partnerships with fungi and some are so dependent upon their partners that their seeds seldom germinate without them.

The leaves of orchids are parallel-veined and often linear, though many broad-leaved forms occur. In the epiphytic species which are often exposed to drying, the surfaces of the leaf are often very heavy and nearly impervious to water.

Orchid flowers are too well known to need description. Suffice it to say that there are three greenish sepals, three colored petals, one of which usually differs in shape from the others and forms the so-called lip. There are never more than three stamens, seldom more than two and usually only one. The ovary is three-parted, but only two stigmas are usually functional. In many genera the stamens are united with the pistils to form what is called the column. The pollen often coheres in a sticky mass, which is transferred to other flowers by insect visitors, but some pollen is mealy and not a few orchids are able to set seed without the aid of insects.

Judged from every point of view, the orchids are a highly specialized race of plants and clearly entitled to the place they hold as leaders of the Monocotyledons. The simplest flowers are without calyx and carolla and are wind-pollinated, in the orchids they have well developed calyx and corolla and are insect-pollinated; in the simplest flowers all the parts are separate and often numerous, in the orchids the parts are united and all reduced to regular circles of three each, except the stamens which have less. The simple flowers are always regular and the orchids again show their superiority by extremely irregular flowers. In the orchids and other high types the flowers are

epigynous, while in more primitive ones they are hypogynous. Wind-pollinated and other simple plants have to produce much pollen; in the orchids the pollen is often much reduced in amount. All these indications mark the orchids the most complex of the Monocotyledons.

EDIBLE PINE SEEDS.

BY CHARLES FRANCIS SAUNDERS.

SEVERAL species of pines in the far west have large seeds which are palatable and nutritious, and besides having long been an important part of the Indians' bill of fare, are prized by the whites of the region for their pleasant taste. One of these, abundant upon the western foot hills of the Sierra Nevada, is *Pinus Sabiniana,* which, because of the fondness of the Digger Indians for its seeds, is locally known as the Digger pine. The noble sugar pine (*P. Lambertiana*) of the Sierra forests also produces edible seeds, but they are difficult to procure on account of the extreme height of the trees, which often tower upwards of a hundred feet before the branches appear. If one waits for the frost to open the burs, one usually waits in vain, as the industrious squirrels get the seeds almost before they reach the ground. A favorite way is to shoot off the cones with a rifle, just before they open. This a good marksman can readily do, as the cones are from one to two feet long and hang at the tip of the branchlets.

The one-leaved pine (*P. monophylla*) is another Sierra nut pine, abundant on the eastern slope and affording a food supply to the desert tribes. Fremont, in one of his narratives, tells of passing an Indian hut quite snowed in save for one path connecting it with a neighboring nut-pine tree, which supplied the isolated family with wood and food till the snow should thaw.

The best known pine nut of the southwest is the seed of *Pinus edulis,* known as the pinon. It is highly prized by the Mexicans and the gathering of the little seeds is an important industry of the Indians of Arizona and New Mexico, who dispose of them to the traders by tens of thousands of pounds during each autumn.

Fort Defiance, Ariz.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

A LARGE HEAD OF SUNFLOWER.—According to the *Ashland Gazette,* the State of Maine holds the record for the largest head of the common sunflower. Last season there was raised in Millinocket, a flower-head of this species that measured fifty-six inches in circumference. The head just filled the top of a flour barrel.

GALIUM LEAVES THAT ARE NOT LEAVES.—Those of our readers who have examined the cleavers (*Galium*) and other plants of simular structure in the Madder family, have doubtless a pretty distinct impression that there are often four or six leaves at each node. This, however, is denied by Lord Avebury, in "British Flowering Plants." He asserts that in all cases there are but two leaves at a node, and that the other two or four organs that appear to be leaves are, in reality, stipules. The leaves may be distinguished by the fact that they have buds in their axils as normal leaves do. When but

two of the extra organs appear at the node, they are regarded as consisting of two stipules grown together, when four are present, they are held to represent the normal number of stipules.

Winged Seeds.—Trees with winged seeds seem to be among Nature's most successful creations. In the maple family alone, there are about a hundred species, and the ash family has nearly half as many and all of them have winged fruits.

Variation in Rudbeckia.—From H. C. Ridlon, Cuttingsville, Vt., we have received a specimen of the yellow daisy (*Rudbeckia hirta*) in which each of the ray flowers is marked by a blotch of brownish purple at base. The plant from which our specimen came had twelve flowers on it, all with the unusual markings. This form of flower has been reported several times before, but it is always interesting and never common. Without doubt it represents one of Nature's variations from the normal, which DeVries has called an "elementary species." With such a beginning it would be a comparatively easy matter to breed a race of plants, all of which should have brown spotted ray flowers, or, indeed, a race in which the entire ray would be brown.

Novel Use For Milkweed Seed Pods.—One day while collecting plants I noticed a couple of caterpillars which I very much desired, and having nothing suitable in which I could put them in, I looked around for something from Nature and noticed a large number of the common milkweed (*Asclepias speciosa*) loaded down with seed pods. I broke one of these off leaving the stem attached to the pod, split it open, took out the silky mass and the follicle then closed up quite tightly making a fine receptacle in which to put my young butterflies. As far as I have had occasion to use these natural repositories I always found them satisfactory.—*Earl Lynd Johnston, Evans, Colo.*

Seed Dispersal of Water Plants.—Lord Avebury in his "British Flowering Plants" observes that water plants do not develop wings or parachutes. While it is true that water plants are by the nature of their surroundings usually dependent upon the water for distributing their seeds, we must not forget that cat-tails, cotton-grass and willows at least, do have seeds modified for wind distribution. No doubt the list could be greatly lengthened by a careful survey of other water plants.

Odor of the Fir.—Commenting further upon the phenomena connected with the odor of the fir mentioned in November Botanist, by Mrs. Buszek, whose name was inintentionally omitted from the note, it may be remarked that the same peculiarity has been noted in Europe in connection with the lime (*Tilia*) and the grape. Lord Avebury writes "A remarkable point about the scent of the lime is that it is said to be strongest about thirty yards from the tree, as if the strength was brought out by some action of the air as it gradually diffuses." No doubt the firs mentioned by Mrs. Buszek must be placed in the same category.

Crimson-Eyed Swamp Mallow.—The form of the swamp rose mallow (*Hibiscus moscheutos*), with a crimson center, was described some time ago as a separate species under the name of *Hibiscus oculiroseus*. Some doubt has always existed as to whether the two were separate species. That the two plants are different, no one denies, but that these differences are specific, may well be doubted. The plant is common along the Atlantic seaboard and was known to all the older botanists. If we decline to belive that there are two species, we find ourselves in very destinguished company. Seeds from both forms have been planted at the New York Botanical Garden, and at flowering time each has produced its own type of flower. This, however, would be only what one would expect. The various types of lettuce, radishes and

cabbage come true from seeds. The significant fact in these growing tests was, that among the progeny of the plant with rose-colored flowers were several seedlings with rose-colored petals, deep crimson bases and seed-pods intermediate between the two forms. The growers consider these forms as natural hybrids, but we suggest that they may be the same sort of "elementary species" that the evening primrose has been found to produce. Breeding from these so-called hybrids, one could easily produce the *oculiroseus* form. Any plant breeder would agree to do it, petals, capsules and all. In view of these facts, how can anybody call the two forms separate species? If the crimson-eyed form merits a distinguishing name, it should be *Hibiscus moscheutos oculiroseus.*

Undiscovered Attractions of Flowers.—It is not always the flowers with the greatest expanse of petal, nor yet those with the sweetest scent, that attract the greatest number of bees and other insects. Often plants with the most insignificant of flowers, and apparently no odor at all are found to be swarming with insect visitors. The common European bryony (*Bryonia dioica*), one of the gourd family, is a plant of this kind. Some have suggested that the attraction consists of an odor that we cannot perceive, but which is noticeable enough to the bees, while others have been inclined to the opinion that the flowers emit ultra-violet rays, which, as Lubbock has shown, are perceived by both bees and ants. A German, Knuth by name, was first to make this suggestion and in support of it, he experimented with bryony flowers and found that they readily affected photographic plates.

Mycorhiza and the Higher Fungi.—It is well known to most plant students that certain plants, instead of producing root-hairs upon their rootlets with which to absorb plant food, have set up a partnership with various fungi in which the fungi act as root hairs and are nourished by the

plant in return for this service. Such root fungi are known as Mycorhiza and for a long time all Mycorhiza were supposed to be produced by a single species of fungus. At present, however, it is known that numerous fungi are concerned in the matter although the identity of but few have been established. According to C. H. Kauffman in the September *Botanical Gazette,* the mycelium of several of the higher fungi may form mycorhiza and those thus far identified, belong to the earth-stars (*Geaster*) pore fungi (*Boletus*) and mushrooms (*Tricholoma, Lactarius* and *Cortinarius*). The author adds another species (*Cortinarius rubipes*) to the list of known mycorhiza formers. The mycelium of this fungus is brick red in color, and may extend for nearly twenty feet through the soil. It grows in connection with maples and others. Doubtless the noticed fondness of certain fungi for certain kinds of woods may be explained in this way.

Botany and Meterology.—One would scarcely connect the study of Botany with that of Meterology; yet among rural peoples and others accustomed to having "signs" for everything we find that they connect certain developments of plants, with that of weather conditions, or in other words, the growth in certain directions of some species of plants foretell the nature of the coming meterological conditions. For example; It is said that the Welsh coal miners of Pennsylvania believe that the nature of the approaching winter may be told by observing the wayside flowers, if they be tall it indicates a long winter with deep snows, if they be low, little or no snow will fall. They reason, that as the seeds of these weeds are the main source of the winter's supply of food for snow-birds and others which linger in the North through our winter, if there are going to be deep snows these weeds will be tall, adapted by the wisdom of an overruling Providence to the needs of these feathered creatures and if little or no snow, the weeds will accordingly be low. Others of the so called in-

fallible signs of these simpleminded people and others who claim to have made a study of the matter are: the thickness of one season's growth of bark on the hickory, oak and maple trees; the size and number of cones on the pine and hemlock; the abundance or scarcity of berries of certain species of plants; the thickness of corn husks and the outer shell of the hickory nut and many others. There are also many "signs" relating to weather conditions applying to Zoology. These people claim, and with some degree of assurance no doubt, that until the science of Meterology becomes more exact they have as good ground for predicting in a general way what is in store for us as our paid weather man. It might be interesting and perhaps of some value if some one would compile a list of these so-called "signs" as far as they relate to Botany. Could we not have, through the medium of the BOTANIST, different observed coincidents between plant life and immediate or remote weather conditions?—*Earl Lynd Johnston, Evans, Colo.*

RANGE OF MONARCH BUTTERFLY.—Not a few kinds of plants are so dependent upon insects for pollination, that their very existence may be said to be bound up with the success of a single insect. Should the latter thrive, the plants flourish and spread to new regions; should the insect fail, the plants decline and perish. As is well known the plant covering of our earth is constantly changing and it is no suprise to find that the struggle for existence is quite as fierce among the insects. The common monarch butterfly (*Anosia plexippus*) the large red-brown insect common in late summer, whose larva feed upon the milkweed (*Asclepias*) is a sort of an English sparrow among the insects and has spread over a large part of the earth. According to Kellogg's "American Insects" it has spread over all of North and South America, the Hawaiian Islands and Samoa, and has also gained a foothold in Western Europe. Who knows what plants it has made rare by crowding out the insects that pollinate them?

EDITORIAL

It is seldom that individuals with money to spare make such good use of it as have the Lloyd brothers of Cincinnati, Ohio. The firm of Lloyd Brothers is widely known to the pharmaceutical world since it is one of the largest of wholesale drug companies, but it is by means of the activities of the brothers John Uri Lloyd and Curtis Gates Lloyd outside of business hours that they are likely to be remembered longest. Both are interested in scientific matters and the first named is also well-known as a writer of entertaining fiction. Curtis Gates Lloyd is an authority on various groups of fungi. Together the brothers have erected in Cincinnati, a three-story fire-proof building for the housing of their immense collections of specimens and the exceedingly complete and valuable scientific library. The doors of this institution, which is known as the Lloyd Scientific Library are freely open to the public during every week day. Although the Lloyd's do not find it necessary to ask for either state or municipal aid in maintaining the institution; its merits are becoming so well known that valuable gifts are constantly being received. One of the most noteworthy of these was recently received upon the death of Surgeon-General James Patteson Walker, of England, who left a magnificent scientific library to the institution together with an endowment of $30,000 for its maintenance. Part of this fund is to be devoted to securing the services of experts in making investigations in medicine and pharmacy. In the present day, when so many are engaged in a wild struggle to pile up immense fortunes, the example of the Lloyd brothers in devoting time and money to things that will tend toward the advancement of science is most refreshing.

* * *

To spend a million dollars so that every dollar shall be well spent is a difficult proposition, though no doubt some

of our readers would be willing to make a try at it. The task of selecting worthy objects upon which to bestow money is daily becoming more difficult for the business of giving a bunch of novels to every community that has not already more than is good for it has nearly come to an end for want of more communities to operate on. Some enterprising billionaire may yet go Carnagie one better by giving a library to every individual who can read and there might be collections of picture-books for those who cannot, but if one has money to give away to deserving objects, why would it not be an excellent thing to devote some of it to the advancement of botany? The prosperity of our entire nation is based upon agriculture, and intelligent agriculture is based upon the principles of botany. And yet how many schools there are in which good teachers are hampered in the presentation of the subject by inadequate equipments. Even with the best of equipment, it is difficult to give the pupil a correct idea of the vegetation of other regions. What advances could not be made by a school with sufficient endowment to enable pupils to visit another region for a week or two each year—pupils of temperate regions enabled to spend ten days of winter in the tropics; pupils in the tropics allowed to spend a week or more of early summer in the North; pupils in the arid regions sent to rainy districts and vice versa. It would not need the income from the price of a Carnagie library to provide yearly trips of this kind for all time. And what a monument that would be to the man who established it! Should any of our millionaire readers be inclined to try the scheme, the editor of this magazine knows of a school that would cheerfully offer itself to be experimented upon.

* * *

One rule adopted by the Vienna Congress that we are not fully willing to subscribe to, is the rule that after a certain date all new species described shall be described in Latin. At

first glance this rule might seem aimed at the weak points in the armor of American botanists for a large number of the most prominent are notoriously lacking in a knowledge of the dead languages. True some of them *have* described new species in Latin, but the less said of a great deal of such work the better the authors will feel, and the less Latin scholars will have to laugh over. It is possible in future that the latter will stop reading the intentionally humorous publications and subscribe for the botanical magazines. We cannot help wondering, however, if we had described a species in good English whether anybody would have the nerve to give it a new name on the strength of having placed our description in Latin. And yet, on the other hand, we must not forget that botany is not of one nation but of all nations. Japanese, East Indians and Russians as well as Germans, French, Italians and Scandinavians are working in botany and they may well insist that if we may describe species in our mother tongue they may in theirs. The selection of a dead language, therefore in which all species are to be described is, on the whole, good. The only objection being that it will tend to place the further advances of the science in the hands of the few and foster a state of affairs that will scarcely be advantageous. This is not the first time that botanists have schemed to have their own small set dominate and command the whole realm of plant studies and we doubt if in the end it will be any more successful.

A new Canadian publication in the line of the Natural sciences is the *Bulletin of the Picton Academy Scientific Association* under the editorship of H. F. Monro. The first number contains a list of 33 species of the myxomycetes of Picton County, N. S., with notes by C. L. Moore.

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SOME FRUITS FROM A TROPICAL GARDEN.

BY WILLARD N. CLUTE.

THERE are many delicious fruits in the tropics, but one must not suppose that all are as palatable as the few that come to our markets, at least if a native of the temperate zone is to decide. They send us their best, no doubt, but Nature has treated us far too well in the matter of native fruits to make us exact and impartial judges. If we were to take the testimony of Jamaicans we should be warranted in ignoring that prince of exotics, the orange, so long as apples are to be obtained. With them an apple is a luxury. All are brought from "The States" as our part of the world is called. But it is no disparagement of our fruit, to place the orange before the apple in the list, though it may be doubted if any of our countrymen would permanently exchange our peaches, plums, cherries, pears and wild berries for all their strange and wonderful fruits. The thoughts of for ever afterward receiving them in tin cans, or tins, as the Jamaicans say, would rise up to spoil the bargain. However, the tasting of unfamiliar products is a novel, if not always pleasing experience, and one to be desired if one does not possess the caution of a tourist of the writer's acquaintance who said when urged to try some of the many fruits before him "No, thank you. I know bananas and oranges and I guess I will stick to them"—and he did. It is the purpose of this article to set forth some of the impressions of one who did not.

After one begins his conquest of tropical fruits, he soon perceives that many are lacking in the qualities that make ours so desirable. There seems to be something in the climate that takes the full rich flavor out of them, just as it takes the viril-

ity and energy out of the inhabitants. Many fruits barely escape being delicious through some apparent caprice of Nature's. Having got together all the materials for the most luscious of products, she spoils it all by witholding one ingredient or putting in too much of another. This charge, however, cannot be brought against her with regard to the Jamaican orange. It is the most juicy and luscious of fruits to be found anywhere. It is a question whether one eats or drinks it. Even those who are ordinarily not fond of oranges agree upon the qualities of this. The general excellence is perhaps due to the directness with which it leaves the tree for the table. No doubt it loses something in being tranported a thousand miles or so. The orange is much used for the "tiffin" or early breakfast, which every normal Jamaican takes before rising. The real breakfast seldom comes before nine o'clock. A favorite way of preparing this fruit for eating is to pare off the outer oil-bearing skin with a sharp knife leaving the white inner portion. Then cut it in half across the "pegs" as the sections are called and eat it out of the hand. The natives have no use for a spoon in eating an orange; such methods are left for Yankee tourists. Most of this delicious fruit is said to come from wild trees which spring up anywhere. It is certainly cheap enough—three good specimens may be bought for one penny, American money.

Sweet oranges are usually picked when they are mature or "full" and the skin still green. One never sees trees of this variety loaded down with ripe fruit, but the Seville or bitter orange, being of little value except for the oil in the skin is allowed to ripen on the tree and falls to the earth unnoticed. Such trees are often as thickly hung with their bright orange fruit as any Northern apple tree is with apples, and makes as fair and attractive a picture as one would wish to look upon. In parts of the island, the natives make a drink, similar to lemonade from the pulp. The juice is mixed with

water and sweetened with the dark brown home-made sugar, when it forms a beverage that looks and tastes very much like new cider. With a pitcherful of this within reach, one is at a loss which most to admire, the climate which makes an abiding thirst possible, or the land that affords such pleasant means of satisfying it. Lemonade seems scarcely to be known, and lemons themselves are not plentiful, their place being taken by the lime which is essentially a small lemon.

Jamaica's principal fruit, regarded from the monetary point of view, is the banana. Immense areas are now devoted to its culture and whole towns depend upon it for their prosperity. The fruit goes to both the English and American markets and requires a large fleet of boats constantly plying between the ports of the two countries to meet the demand. All good Jamaicans must daily thank heaven that Americans have such fondness for the banana. The bunch of bananas have ceased to be a novelty even in our farthest backwoods towns, but the plant from which it comes would scarcely be recognized in many places. In respects it is like a great cornstalk, but with much broader leaves, so broad, in fact, that the natives use them for umbrellas when caught in a storm. Each stalk produces a single bunch of fruit. In market these bunches are usually hung up with the fruit pointing toward the earth, and this is the way they begin life on the plant, but as the weight of the bunch increases; it bends the stem so that at maturity they point upward. Beyond the bunch of fruit the stem extends for a foot or more in a scaly tail with a bunch of purplish bracts and sterile flowers at the end.

Like oranges, bananas are not allowed to ripen on the plant, even for home consumption; in fact, it is considered an indication of extreme shiftlessness to allow them to ripen thus. As soon as the bunch is "full" the whole stalk that bore it is cut down and another from the same root takes its place. The price varies with the seasons, but it is not unusual for the culti-

vator to receive but sixpence a bunch of nine "hands" as the clusters of fruit are called, and threepence for one with seven handes. Smaller bunches are not accepted for export at any price.

Although a large amount of grape-fruit annually comes to our markets, it seems practically unknown except in the cities. To all intents it is a kind of large orange, being constructed like that fruit, but with a flavor that is all its own and like nothing else. In some places it is disliked because of a bitter taste in the membrane surrounding the sections of pulp, but in its home it has no trace of this and would seem to grow bitter only when obliged to go to foreign markets. It is usually eaten by being cut across the sections, the centre where the sections meet cut out with a sharp knife and filled with sugar, the pulp mixed up with a fork and finally carried to the mouth with a spoon. The shaddock is often regarded as but another name for the grape-fruit, but there are a few minor differences. The shaddock tree is like an apple tree in appearance and in the proper season is loaded down with fruit of truly monstrous proportions. This fruit is shaped like a pear, but its size and weight suggest the idea that it was once round and has sagged down in this shape through the sheer fatigue of holding on to the tree. The pulp is coarser than that of the grape-fruit but otherwise much resembles it. The citron is allied to the same class of plants but looks more like a very large lemon. It has an exceedingly thick rind and a coarse acid pulp. The rind is about the only part used, being generally candied.

Of the fruits that rarely come to our markets, the mango easily stands at the head. It is said to originally have been introduced into the West Indies from India, but now has become thoroughly naturalized. In its season it is the chief, if not the whole subsistence of the negroes. While mangoes are plentiful, it is difficult to get a negro to work at all. He

sees no need of it so long as his food can be had for nothing. This fruit diet is not without its effects upon the bodies of the people; the children especially, usually measure much more around the abdomen than anywhere else. The mango is like a plum in appearance with a thin yellowish or reddish skin and salmon colored flesh. It is most delicious stewed, but is usually peeled and eaten raw. The flesh is soft and juicy and the novice seldom handles it with becoming dexterity. There is a saying that one must take a bath after eating it. The difficulty in handling it is increased by a single large seed in the center, covered with long hairs that ramify through the pulp, rendering eating it very much like sucking a bunch of cotton. Since the mango grows wild, there are all sorts and conditions of fruit from the turpentine mango, which is all its name indicates, to the famous "No. 11." The latter is the *ne plus ultra* of mangoes but a very fugacious object, and some doubt whether such a thing really exists. One is always informed that a particularly fine fruit "looks like a No. 11" or is "nearly as good as a No. 11," but few if any have seen the real thing. There is so much difference of opinion that the skeptical are inclined to consider it a sort of mythical standard of excellence. The better class of mangoes are agreeably flavored, stand transportation well, and would no doubt, find a ready sale in America if better known.

After the mango comes the star apple in point of value. It is a round smooth fruit the size of a large apple and constructed very much like the persimmon of our Southern States. So nearly alike are the two, that to judge from the fruit alone, one would be inclined to call this a new sort of persimmon. The skin is sometimes green, but usually is of a deep purple color like that of the common egg-plant of the gardens. In the center are several seeds enclosed in half-gristly envelopes and surrounded by an agreeable, soft, milky, white or purple pulp. When the fruit is cut across, the arrangement of the

seeds makes a star from which the fruit gets its name. For the table, the pulp is often combined with orange juice and is then called "matrimony."

The average civilized man approaches the custard-apple with misgivings and leaves it with disgust, and yet in this fruit, Nature came near to producing one of her best creations. In its present state, however, it is likely to impress one as being unfinished; as a fruit abruptly halted on its way to perfection. It is a round or eggshaped affair of yellow color and as large as ones two fists. Its substance is soft and custard-like, but after tasting it, one is inclined to believe that this particular custard was not baked enough, or that it was not concocted by a master cook. It tastes for all the world like flour and water with a dash of lemon and slightly sweetened. There is no use going to the tropics for the custard apple when one can get uncooked flour paste and sugar at home.

The sour-sop is some improvement upon the custard-apple, but not enough to make much difference in value. In shape, size and structure they are much alike, but the outside of the sour-sop is warty and encloses a somewhat firmer pulp. There is considerable acid in its composition, but it had the same raw taste as the custard-apple. It is only endurable to most palates when made into a drink by pouring boiling water upon it. It then has the look and taste of sweetened buttermilk.

The reputed fondness of the American for sweets follows him to the tropics and among the first fruits to be recommended to his consideration is likely to be the naseberry. This is not a berry at all, in fact tropical berries are few and far between. It is probably the sweetest of tropical fruits, but has only sweetness to recommend it. It resembles the star apple in structure and belongs to the same family of plants. The skin is rough and of a swarthy brown and the flesh is nearly of the same color. The latter is soft and juicy, but coarse grained and

has been likened, by one not over enthusiastic traveler, to brown paper pulp sweetened. It also has a faint pear-like flavor. The negroes consume large quantities of it.

A familiar and characteristic sight in all lowland towns is that of the bread-fruit tree, with its short stubby branches, broad leaves and round green fruits. The latter is borne upright on a short, thick stem and ranges from the size of a croquet ball to that of a man's head. In looks it is like a much enlarged fruit of our button-ball tree. The usual way of preparing it is by roasting. It then tastes and looks like squash.

The much rarer Jack-fruit is own cousin to the bread-fruit, but is not to be mentioned in the same breath. Externally the two are much alike, but the novice will never confuse them because of the jack-fruit's unbearable odor. From its presence all other malodorous vegetables must retire abashed. When it reaches the kitchen, nobody need be told of its arrival. It is therefore seldom admitted to good society, but if one can disassociate the horrid smell and the taste, it will be found to be sweet and melon-like in flavor. The edible part is a yellow glutinous substance in little pockets surrounding the seeds. The seeds are also eaten after being boiled.

Among curious fruits, none are more remarkable than the cashew-nut. Nature seems to have been undecided whether to make a fruit or a nut of this and to have compromised by making both and stringing them on the same stem. One sees a smooth red pulpy fruit, and beyond it at the blossom end a crescent-shaped nut. Evidently the pear-shaped fruit was intended to enclose this nut, but in some way it escaped and carries on business independently. When one first beholds it he can scarcely realize that someone is not playing a joke upon him. The fruit is slightly acid and rather tasteless when raw, but cooked with sugar, forms a very palatable dish. The nut is roasted and tastes very much like the peanut. The real peanut is rare in Jamaica.

We must not, in passing, forget the humble, though exceedingly important gourd or calabash. Our gourd is the fruit of a pumpkin-like vine, but in warmer climes the gourd grows on trees. The individual who rejoiced when struck by a falling apple that pumpkins do not grow on trees, had certainly never visited the tropics. The calabash is often as large as a pumpkin with a hard and woody shell, covered with a thin green rind. Inside it is filled with a mass of seeds and pulp that suggest our gourd, but the two are not related. The natives utilize the calabash in many ways. Their dishes, jars, baskets, water bottles, and in fact most of their household utensils are made from it.

The cocoanut is said to be the most useful tree in the whole world. It is certainly so in the tropics. Sugar, wine, oil, fibre, timber, cloth, and a host of other things are obtained from it. A tree comes into bearing about seven years after planting and bears for a lifetime, not an annual crop, like our nut trees, but in perpetual season. There is always a small cartload of fruit in various stages of development at its crown. Each leaf that puts out is followed by a string of flowers succeeded by several nuts. When growing the cocoanuts are enclosed in a thick husk. The three eye-like spots on the end of the cocoanut are not produced artificially as many suppose. On the tree they are turned toward the stem as if watching to see that it does not let go of the tree until ripe. The cocoanut reaches its full size before the meat within begins to develope. At this stage it contains about a pint of cool, clear, slightly acid, water with a faint cocoanut taste. One may drink this in any quantity without ill effects. It is a most excellent, refreshing and desirable drink in a land where practically all the drinking water is taken from the streams and often without regard to the fact that a large number of colored folks are washing their clothes further up in the same stream. In the towns, venders go about with cartloads of these "water cocoa-

nuts" which they sell for a cent each. When one wishes to drink, the native chops off the husk at one end as one would sharpen a fence post, and with two deft strokes opens the nut. One thus quaffs from a cup that was never used before and will never be used again.

Only a few of the fruits from a tropical garden have been touched upon in this article. In the markets of the large towns, one always finds a bewildering array of vegetable products and as he walks through the crowded passages and surveys the huge piles of fruit, he feels as if he were visiting some successful horticultural show. Many of the fruits have suggestive and alluring names, as rose apple, sweet-cup, sweet-sop, granadilla, lotus-berry, papaw, mamee, guava, etc. Not all are as pleasing to the taste as their names would indicate, but one finds both interest and amusement in tasting them all.

"PERUSIN'" THE "PENNYRILE" COUNTRY.

BY SADIE F. PRICE

(Concluded)

OUR NEXT drive of twenty miles brought us to a little village among the knobs, a village of perhaps a dozen houses. Unfortunately the day of our journey was a rainy one; but the impulse to dash out into the mud and rain when some especially interesting plant was seen, could not be resisted. The beautiful yellow-fringed orchis, a plant not before found in this State, we gathered in this way. It had ceased raining when we reached the town, and as we drove up to a house on a hill, where we had heard we could obtain good board, we were the cynosure of all eyes. Before night it was known to all the town that "a woman that's huntin' weeds," was among them.

We sallied forth the first morning, following our young guide single file, through the Jimson weeds and bouncing Bet of the streets, armed with collecting outfit, lunch basket, and

kodak for a day under the cliffs. We wondered what they thought of our extended tramps, as few in this part of the country see any pleasure to be gained from the woods save the manly one of killing something—a bird or a fish, or sometimes larger game. A remark, however, made to us before we left—"Now, if you women jes' had bloomers," showed the light in which we were regarded, and made us see ourselves from their focus.

This locality, as well as the one we had just left, had its "Indian Fort." A favorite name for any oblong knob, in the range of hills, was "Potatoe Hill." One hill of this name, over a mile long, was surrounded by cliffs that were worn into many picturesque grottoes. One of them, Buzzard's Cave, was quite large, and served us as a pleasant retreat for a noonday meal, or during a sudden shower. Our freckle-faced, bare-footed guide told us where we should find the "mostest fyarns," and asked many questions about "the street cyars that ran with a wire," "Wasn't ther nothin' pretty in town that you should come up heah to hunt somethin' pretty?" he inquired. He had perfect faith, that if called, the "doodle bugs" would come up out of their dens. His faith was so genuine that it gave us great pleasure to keep him calling the ant-lions at their traps in the soft sand,—little hollows in the earth where each insect waits with open arms, so to speak, for an intruding ant. This insect has been immortalized by Riley.

"An' nen he showed us little holes
  All bored there in the ground,
An' little weenty heaps o' dust
  'At's piled there all around.
That wus the Doodle-Bug's charm—
  To call 'em up he said:—
'Doodle! Doodle! Doodle-Bugs!
  Come up an' git some bread!"

The boy's faith did not flag,—even after repeated failures—at their non-appearance, and when, only with the assistance of a hair-pin, was one uneartehd, he still did not lose confidence that they usually came when called. We watched one of these grotesque little creatures excavating its house. It worked beneath the earth, travelling backward, round and round, tossing the sand, sending it twice the length of its own body, till it fell in a tiny shower far from the hole. When it had made a perfectly round depression, an inch deep, it waited, with only the tips of its antennae uncovered, for its unwary prey.

Nolin River, a small stream that flows into Green River, of whose wild and grand scenery we had often heard, was the next point of interest that we visited. Though it was off the general line of travel and away from railroads, we were not deterred from going. In the local vernacular, we went to the "yan side" of the river. We drove four miles towards the river in a farm wagon. Our driver and guide could have posed for Riley's "Raggedy Man,"—a more ragged and also more listless and spiritless creature I had never before beheld. He surprised us by saying as we passed a cave in the cliff,—"If I was in the moonshinin' business now, I wouldn't want nothin, better' this place." He "holped his daddy when he was in that business," he said.

We found board at a log cabin near the little river. The bare-footed wife and children crowded about us and we learned much of life among these wild hills and cliffs. The husband, too, had been a moonshiner, and he told us with pride that he had "only been took up four times." After seeing so much of these endless caves and cliffs one is quite surprised that the revenue officers ever succeeded in finding these law-breakers. When I expressed as much to this man, he said that they would never have found his "still" if a neighbor had not got mad and reported him. They speak of moonshining—of

course protesting that they are out of it now,—as one would of mercantile or any other business. The old man said there was no other way, after the war, to support his family. These haunts of the moonshiners and the mounds of the aborigines scattered about, recalled to us many of Craddock's characters. We thought of the graves of the "Stranger People" and could almost distinguish "leetle Moses'" voice among the bird voices.

The rich, full notes of the summer red-bird, the wood-thrush and the Kentucky cardinal, or cardinal grosbeak and the ever-present mocking wren, filled the woods with melody, while the call of the partridge sounded along the roadsides. The mocking-bird, that "trim Shakespeare of the trees" was heard, his interesting relative, the brown Thrasher, was here, too. He would cease to sing as we stopped to listen, and then, as we kept quiet, he began again, low and sweet; so low and clear, we could almost imagine, if we did not see the bird half-hidden by the leaves, that he was at least a quarter of a mile away. He was a veritable ventriloquist, and was trying to deceive us as to his distance from us. Finally growing bolder he would pour forth a rich melody unequalled by any Southern songster save the mocking bird. We heard many stories of the number of "rattlers" and copperheads to be seen here, till pictures of Elsie Venner's cave passed before us, but we saw none in our rambles.

In the State report, this part of the country is thus described: "All its water-courses, even the smallest, wet-weather brooks and spring branches, take their rise between a series of steep cliffs, which form an elevated water-shed between Bear Creek and Nolin River, running in parallel courses, for five or ten miles apart, for a distance of twenty miles. This water shed is intersected on either side by deep, high-walled ravines whence gush forth cool springs, which either

sink in the porous sandstone or murmur and plunge headlong to these rapid creeks."

The forests here are a generation older than those in adjoining countries, and the trees much larger. The country has evidently been burned over at an earlier date than other parts of "the barrens."But the county is fast being denuded of these large trees. Many companies, each employing two and three-hundred men, are at work in different parts of the county, cutting trees for cross-ties. Many lordly chestnut and other oaks, have been felled, and still the work goes on. The deep gulches cut by these two streams, Nolin and Bear Creeks, considerably modify the climate. In the gulches, at least, and between the ridges of sandstone and conglomerate, the extremes of heat and cold are greatly reduced; but when the country is laid bare of its trees there is likely to be a greater climatic change, as well as the disappearance of many plants now found there.

A walk of a mile, after leaving the moonshiner's house, brought us to Nolin River. We were ferried across in a "dinky boat—a clumsy affair, like a ferry-boat, but with a small room at one end with machinery for raising sunken saw-logs. After several heavy rains the river was now high and very swift, the banks muddy and much of the lowlands under water. We toiled through a cornfield that had recently been over-flowed and along a hill-side for "three quarters",—these people seem too indolent to finish a sentence,—but say "it is a *quarter* to yan house;" or "a half to yan hill,"—until we reached Dismal Rock, a perpendicular wall of rock, that was surveyed by the state geologist in 1875 and found to be three hundred feet high. At its base and along the banks were many trees not found elsewhere, among them the large-leaved magnolia, hemlock, Jersey pine, laurel and holly.

A full view of the rock could not be obtained from the base, so we decided to go to the cliffs on the opposite side of

the river. To avoid the muddy lowland again, the guide was sent ahead to secure the "dinky" boat and come up stream for us. It did not take long to discover that we were to see a little of the treacherous side of Nolin River,—a river full of whirlpools and eddies. The river was out of its banks and very rapid, the boat unwieldy, and the guide not a dexterous oarsman. We made slow progress; but when the boy lost an oar, we were at the mercy of the contrary stream, so that to return to the ferry was the only alternative. The boat swung back and forth down the stream, brushing against the willows on one bank, and then on the other, till we finally reached the landing. We passed the "wagon shed," part of the cliff with a natural tunnel beneath, that formed a natural bridge; but the chief point of interest we visited during the day was a certain cliff where the botanist, Prof Hussey, is said to have found, for the first time in this State, the rare fern, *Asplenium Bradleyi*. I went to rediscover its station, and found it, still growing on the face of a high arching rock, with many other ferns about the base. Along the stream the ground was carpeted with them; but the fate of many of them is sealed, as the denuded hills let in the sunshine, in many places, more familiarly than is liked by some of the species.

Under the over-hanging sand-rocks, sheltered from the sun's rays, were spaces of vast extent where the mound builders as well as the Indians had evidently had their homes. This is shown by the many relics that have been found here; by the mounds in the neighborhood and by the mortar holes in the detached masses of sandrock. At one of these, our guide exclaimed, with a knowing air, "This is wher the Injuns ground ther *coffee!*"

Near a cliff where there are two mortar stones there is a large bed of mussel shells, this, too, at quite a distance from the river. In a field in the lowlands between the ridge and the river is a group of limestone slabs, set endwise at regular

distances, about two feet apart. The stones were evidently carried here a distance of a mile or more, as it is this far to a limestone ledge. They were half covered by the roots of a large mulberry tree that had grown between them. These slabs, with the heaps of shells and the mounds not far away, show, no doubt, that this was once a camping ground. The owner of the land reluctantly consented to let us dig under the roots between the stones. We unearthed a few bones, but as these people are all so superstitious in regard to disturbing these places, we desisted from further search.

We made frequent rests in our excursions. These stops too were half the pleasure of the tour. We climbed or walked till some feature of the scenery was especially pleasing, a deep ravine, a tiny water-fall, or immense fallen rocks,—fern-covered, if of sandstone; bare and massive, as though Titans had been at work, if of limestone; or till we reached some cool and enticing spring, that suggested that this would be a good place to dine or rest.

Turning at last homeward we stopped a day or two at a more commodious house than any we had visited. The owner, a Baptist preacher, could neither read nor write. After dinner, though we were anxious to be off to the woods, the old man insisted we should stop to hear him play a tune or two. He opened, what I, with only a casual glance when I entered, supposed to be a small cabinet organ, and began to play. It was, however, one of the music-box kind, worked with treadles. Never shall I forget the extreme torture of that half hour of the warmest afternoon of last July when, with the cool cliffs and caves of the hills in full view, I was compelled to listen to the loud strains of an "organette," or whatever this particular machine of torture was called. The picture was ludicrous in the extreme, the aldermanic-looking old man, whose avoirdupois was probably three hundred and fifty, dressed in blue and white cottonade, coatless, with

his broad-brimmed hat pushed back from his red, perspiring, smooth-shaven face, working the treadles as energetically as a "scorcher" in a contest. My friend said the contrast between the evident enjoyment of the musician, his face showing extreme bliss as the ear-splitting notes of "Hold the Fort" and "The Sweet Bye and Bye" rent the air, and my expression of exquisite torture as I looked longingly at the hills and green things growing opposite the windows, was worth to her all the fatigue of the journey.

We travelled through a country so novel, and so varied that the incidents here given are only a few of many; for each mile, and every house we entered had its own experience and history. After many weeks spent in this wild, charming country, that in many places seemed so different from the outer world, I could not but think of what changes would come if the projected railroad was built. A railroad will be a great educator, but by its coming, the country will lose much of its picturesqueness. The earth is rich in minerals, iron ore in every cliff, and coal, marl and asphalt in abundance. Hence only a railroad is needed to make some of these people rich. It is too late to take the listless, indolent air from many of them, whose lives have been so barren of interest and motive, but the younger generation would awaken to new energy.

We made the return home by various ways of locomotion, farm-wagon, stage and railroad, with a well-filled botanical case, and with a kindly feeling and often sympathy for these persons so far from the bustle of active life, these dwellers in the wild parts of the "penny-rile country" and on the "yan side o' Nolin."

AN AUGUST OUTING.

BY FRANK DOBBIN.

A SETTING of beautiful scenery always lends an added charm to a botanical excursion. Mountain, forest, lake, stream—what pictures the words conjure up when one

gives a retrospective glance to the trips of the past season or turns over the pages of his notebook. He can hear the tinkle of the waterfall where he first lighted upon some rare plant, or the song of the veery, that made the woods melodious where he found some other long-looked for specimen upon his evening stroll.

It was my privilege to take such a trip during the past summer in the company of Mr. S. H. Burnham of the New York State botanical department. It was in that beautiful region about the head of Lake Champlain—so rich in historical interest and associations. Add to this scene the drowsy haze of August, when summer having passed the climacteric pauses yet awhile ere she gives place to autumn. On such a day we rowed slowly down the creek which enters the head of South Bay, the upper extremity of Lake Champlain. Here we made many interesting finds, as this little stream is particularly rich in the water plants. The first to attract our attention was the white water crowfoot, (*Batrachium divaricatum*). Farther down the creek I saw for the first time the great bladderwort, (*Utricularia vulgaris*) in flower. This was found in a backset of the creek proper and here the water was so choked with water plants that it was hard to force the boat through their clinging masses. The most conspicuous was the water milfoil, (*Myriophyllum heterophyllum*)—resembling when in the water nothing so much as the tail of an angry cat. In this tangle of aquatic plants we also found that somewhat rare water-loving composite, the water marigold, (*Bidens Beckii*) just coming into flower. Here also was the ivy-leaved duckweed, (*Lemna triscula*), the waterweed, (*Elodea Canadensis*) as well as the common water shield, (*Brasenia peltata*). We also noted two of the yellow pond lillies, (*Nuphar Kalmiana*) and the red-disked *Nuphar hybrida* of Peck.

Farther down the stream where it passes along the foot of diameter Precipice, which towers up nearly 1300 feet on the

left, we found the lake cress, (*Nasturtium lacustre*). *Potamogetons* were there in abundance. To me, however, *P. heterophyllus, P. praelongus* and *P. obtusifolius* were new. A few plants of that most beautiful of our native water lillies, *Nymphaea tuberosa* were seen. The arrow-head was here in abundance in the shallows and we particularly noted *Sagittaria Engelmanniana* together with the green water arum, (*Peltandra Virginica*), which was sparingly present.

Leaving the creek we climbed far up the foot of the precipice and were rewarded by finding the bladder-nut,(*Staphylea trifolia*). As we were about leaving the precipice on our return up the creek, we put the boat back to examine a curious lichen, near the base of the rock, which proved to be *Umbilicaria velosa.* We had earlier in the day found that semi-aquatic lichen, *Endocarpon fluviatile.* On our homeward way we passed through a lovely glen, locally known as Horse Heaven, and here we found the large twayblade, (*Leptorchis liliifolia*), while a bit farther on we chanced to find the Huron orchis, (*Limnorchis Huronensis*).

The next day an excursion to some small lakes near the head of Lake George resulted in other interesting finds. Among them being Carey's persicaria (*Polygonum Careyi*) and *Lysimachia producta;* also the little humped bladderwort, (*Utricularia gibba*), found upon some apparently floating islands in a small pond. The great find of the day, however, proved to be the whorled bogonia, (*Pogonia verticillata*). Not often is it given to a botanist to see this rare plant growing. Only one small patch of perhaps twenty individuals rewarded our search. Another orchid quite abundant in this swamp, was the checkered rattlesnake plantain, (*Goodyera tesselatum*).

The ferns, too, came in for their share of attention and my notebook shows the addition of Goldies' fern, (*Nephrodium Goldieanum*) ; the narrow-leaved spleenwort, (*Asplenium an-*

gustifolium) and that curious variety of the Christmas fern known as *Polystichum acrostichoides crispum.* But space will not allow me to enumerate all the plants collected and carried home for further study and future reference. Only those who have made such a trip in the company of an enthusiastic botanist can appreciate its delights.

Shushan, N. Y.

THE BAOBAB.

BY DR. WM. W. BAILEY.

WE Americans are inclined to think that we possess a monopoly of the world's big trees. We were fairly delighted and filled with patriotic pride when the great conifer of California, first named after Wellington, had to be relegated to the genus *Sequoia.*

Our red-woods of the same genus, now alas! fast diminshing before the demand for lumber, are many of them enormous. Many a white pine in our north-eastern woods is a splendid giant. But even before our recognized "big trees" were discovered, the *Adansonia* or baobab was known to travellers, and since then, the great gum-trees, (*Eucalyptus*) of Australia have put in a just claim for size.

The baobab or sour-gourd is a native of many parts of Africa; it rises to seventy or more feet in height, while the diameter of the trunk may be of the astonishing proportion of 100 feet! The large, solitary, white flowers are six inches in length and hang on long stalks. They are succeeded by a hard, woody capsule, eight inches, or sometimes a foot in length, and, in appearance, like a gourd.

The plant is sometimes known as "monkey-head," and was called by Humbolt "the tree of a thousand years." He calls it also "the oldest organie monument of our planet," Adanson, whose name the plant commemorates, made a calculation to show that it must be 5150 years old. It is not stated how firm was his belief in Bishop Usher's chronology.

Livingstone, the orthodox, says: "I would back a true Mowana (the name given it in the neighborhood of Lake Ngami), against a dozen floods, provided you do not boil it in salt water; but I cannot believe that any of these now alive had a chance of being subjected to the experiment, even of the Noachian deluge." The tree has various uses. Its strong fibre furnishes very durable ropes, so that in Bengal it is a common expression, "As secure as an elephant bound with a baobab rope." The pounded leaves are mixed by the Africans with soups under the name of "Lalo." They diminish perspiration and keep the blood healthy. The fruit is a very useful part of the tree. It contains a slightly acid, agreeable pulp, and is frequently eaten, while the expressed juice, mixed with sugar, is a very healthful drink, and employed even as a febrifuge. The branches being short and curving, and the trunk so broad in proportion to the height, the plant assumes a dome-like appearance.

Providence, R. I.

NATURAL HISTORY OR LIFE HISTORY?

TWENTY years ago, the teaching of botany in this state consisted chiefly of plant description and identification principally by means of the flower. That was the kind of botany taught me, and however much it may have been condemned, yet the so-called "analysis of flowers" was a delightful study. I would make long journeys to the woods and along the lake shores and the river valleys that I might have the pleasure of finding a specimen new to me. That was the way I taught botany, and I had my pupils watch for the first spring flowers just as the Audubon people are now doing with the birds. Now it may be that the old way of teaching botany or the old matter that was taught, was not as scientific as more modern methods and subject matter, yet they had at least one virtue and that is they took the pupil out into the woods. If the only object the pupil had was to find a new

flower and a new name, yet he learned unconsciously its habitat, could tell you where to look for others like it and could recognize others as far as he could see them.

Then came the days of the microscope and stains and paraffin, etc., and instead of sending the pupils out into the woods, we had to make sections for them and show them cells and they had to draw and describe from the microscope. Now while the cell is the unit of structure, and while it might seem that there would be the logical place to begin the study of biology, yet a knowledge of cells is not what pupils of high school age should know about first. It is more important that any one should know first the place where liverworts grow and how they look when growing and where one may expect to find them than to know how great a differentiation has taken place among its cells or what is its life history.

I have known college students who have worked out the whole of the life history of *Marchantia* and had never seen the plant growing in its native haunts. I remember well my experience with *Nostoc*. I worked it out in the laboratory and thought I was well acquainted with it, but it was long after I had finished it before I found it and when I did find it, I did not know what it was.

But this is not such a bad thing among college or university students, for they have or ought to have a large background of scientific observation upon which to base their laboratory work, even if it be on plants other than those on which they are working, but for high school pupils of the first year it does make a difference for we must remember that on account of their extreme youth for one thing they have no background upon which to work and in the larger towns and cities they have but little opportunity to learn anything about plants and annimals from actual observation.

It is more important first that high school pupils should be able to know mosses and ferns and be able to know where

to find what plants they want than to know what is meant by the alternation of generations. In other words it is of first importance that high school pupils know the natural history of a large number of plants than their life history. Then laboratory work will have meaning.—*From an article by D. R. Ellabarger in School Science and Mathematics.*

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

WARNING COLORS OF FLOWERS.—Herman Muller notes in one of his books, that the European poppy (*Papaver rhoeas*) is not grazed by herbivorous animals, and he regards the glowing red of the flowers as a warning or "terrifying" color that announces to the cattle, that the plant contains poisonous juices. It is quite possible this is true, but red is not always a terrifying color to cattle. People in red jackets seldom botanize twice in pastures if the king of the herd happens to spy them. The color of the jacket is likely to cause terror in the wearer, however.

FOLK-LORE OF PLANTS.—In the December number of your journal, I ran across a note by Earl Lynd Johnston, of Evans, Colo., on the folk-lore of plants and meterology. This is, of course, a large topic in itself, and like all branches of folk-lore has never been exhaustively treated or even fully studied. Allow me, however, to point out to your correspondent a few of the chief sources. For the person desirous of look-

ing further into this interesting subject, a general reference may be given to the special articles on superstitions concerning plants and the weather that have appeared in the Chap. XIV of "Current Superstitions" (Vol. IV 1896 of the Memoirs of the Am. Folk-Lore Society) by Mrs. Fanny D. Bergen, and Chap. XI of the same author's—"Animal and Plant Lore" (Vol. VII, 1899 of said Memoirs) refer to this topic in particular. Mrs. Bergen's volumes are the most considerable collections of animal and plant superstitions made in England and America, and her numerous lists of American plant names (an important and interesting branch of folk-lore study) are the chief contributions of the sort in America.—*Veritas.*

Commercial Bast.—Several of our most important textile fibers, such as flax and hemp, are obtained from the soft bast of various plants, but it is seldom that this bast is so well developed in any species that it may be used like cloth without being woven. In the limes or lindens (*Tilia*) the bast is so well developed in the bark that the trees are often popularly known as bass-woods and mats are often made from the bark and used by gardeners for protecting cold frames, etc. The best known example of bast that is coherent enough to appear like cloth is no doubt the lace-bark tree (*Lagetta lintearia*) of the West Indies. This bark by soaking in water and beating may be separated into many regular layers as soft and white as lace and yet strong enough to be used in making party dresses. The bast that has the greatest use in manufactures, however, is a tropical India product. It is sometimes called nava fiber and it the product of *Sterculia Balanghas.* As it comes to our markets it is a yellowish white fabric a foot or more wide, often twenty feet long, and the best of it, as soft and delicate as good grades of cotton, though the meshes of the substance are much larger than those of cloth of like texture. The weaving of this bast, however, is entirely of Nature's

doing, though this is not easy to believe when examining it for the first time. The fiber under the name of bass is largely used in cigar factories for tying up bundles of cigars. We are indebted to Dr. William Trelease of the Missouri Botanical Garden for the identification of specimens. Dr. Trelease writes that he recently saw in the possession of Dr. C. F. Millspaugh of the Field Museum some foreign cigars, each of which had been wrapped in a sheet of this bast, much as a bottle is sometimes wrapped in a thin veneer of cottonwood or other protective material.

Diana's Paint-Brush.—It may be quite possible that poetic New Englanders, as Dr. Bailey reports, have given the name of Diana's paint-brush to the orange hawk-weed (*Hieracium aurantiacum*), but in eastern Pennsylvania, where this detestable weed has painted square miles of fields with red, the farmers have given it a more appropriate name. They still call it paint-brush, but the owner of the brush is there said to be a certain subphurous individual, whose only resemblance to Diana is that his name begins with the same initial.

Plants With Peculiar Names.—The common names of plants are most convenient handles at times, but the scientific names also have their uses. We might better use the latter than some of the common names in use among gardeners. A writer in *Florida Agriculturist* mentions some of these as follows: A friend of mine, living in the far West once wrote me that a friend had sent her some plants. Among them a "Joseph's coat of many colors," an angel's wing, "the forbidden fruit," and "the wandering Jew." She seemed so delighted over those plants, that I concluded to increase still further her happiness, by sending her "celestial bride," the "star of Bethlehem," and "Solomon's seal." I sent, also, "the cross of Jerusalem," "Jacob's ladder," and "Job's tears." Enough, surely, to satisfy her ambitions in the way of plants

with peculiar names.—[Without going into the gardener's list, we could add from the botanical manuals, butter-and-eggs, brown-eyed Susan, Dutchman's breeches and bloody noses. —*Ed*].

PLANT DISTRIBUTION—When one sees the water cress (*Nasturtium officinale*) so common along our streams he is led to wonder from whence it came, also how and when. I have heard a number of persons say that it was introduced into Colorado, by the soldiers at the many Forts found within the State in early days. This plant has a reputed medical quality, that of relieving, and, in some cases of curing, the scurvy and hence was planted for this purpose. As to the correctness of this I do not know. If one tastes this plant he finds it not unwholesome with its very marked *Brassica* acridness. If any other reader of the BOTANIST has heard anything relating to this plant could we not have it made public through this great clearing house of botanical knowledge?—*Earl Lynd Johnston, Evans, Colo.*

THE CAUSE OF ANNUALS.—Undoubtedly annual plants have arisen in response to more than one set of conditions, but it is an interesting fact that dry regions greatly favor the production of such plants. This is of course due to the fact that annuals can spring up after the rains, and mature their seeds before overtaken by drouth. The more deliberate perennial plants find this impossible. Alpine and Arctic conditions, on the contrary, favor the existence of perennial plants. Moist tropical regions also produce a large number of perennials, but the tropical perennials differ from the Arctic perennials in one important particular. In the tropics the perennials of dry regions are, nearly all of them, like those of Arctic regions in having the perennial parts underground, though the conditions, that necessitate this are so widely different. Bulbous plants usually form the great majority of dry ground perennials.

EDITORIAL

We are inclined to believe that during the past half year the numbers of this magazine have been a distinct improvement over any that have preceded them, and the complimentary expressions with which correspondents frequently favor us, show that they too appreciate the efforts we are making to produce a good magazine. We should like at once to make this magazine as big as any dollar literary magazine on the market, but an experience of many years has shown that a successful botanical magazine is of slow growth. It takes time and discrimination on the part of the public to distinguish between a mere picture book and a magazine of solid information. As between any of the literary magazines and ours there can be no comparison. It all depends upon what you want. If it is botanical information, fifty dollars invested in the big magazines will not bring the returns that fifty cents will, if invested in THE AMERICAN BOTANIST. But until we accumulate subscribers enough to warrant an enlargement, we purpose continuing in the usual way making the magazine as good as its patronage deserves and looking forward to the time when it is sure to have a much wider circle of readers and a greater number of pages. As it is, the amount of actual information we offer in a year is, we think, worth the price charged and with the certainty that the numbers for 1907 will be better than ever, we earnestly invite all whose subscriptions expire with this number, not only to renew, but to help us toward that much-to-be-desired increase of circulation, by sending us the names or subscriptions of others interested.

* * *

As usual, we send out with this issue bills to all who are in arrears for subscriptions. In order to make subscribing as easy as possible, we allow subscriptions to be paid during

the year when most convenient, but when expired subscriptions extend beyond this time, we find it necessary to send them to a collecting agency for investigation. Sometimes the only way we have of discovering that a subscriber is dead, is by asking the agency to look him up. We trust that none of our subscribers in arrears are dead, but if not, we also trust that we shall hear from them. We can say truthfully that thus far we have not lost a single subscriber by death, whose subscription was paid in advance. As a mere matter of precaution, we suggest that those in arrears pay up.

* * *

As the single numbers of this magazine come to hand, readers may fail to appreciate the amount of valuable information they are getting for a dollar, but take up the year's numbers, and you will find you have a larger volume on plants than can be bought elsewhere for a dollar. It takes time to make the value of the magazine apparent. We know this because we sell more back numbers to old subscribers than we do to new ones. After they have been reading the magazine a while they seldom fail to order the volumes they do not have. If you doubt that the back numbers are still of interest, take another look at any of them. There are a lot of things there that you had forgotten already, we will venture.

* * *

Clumsy man will apparently never relax his efforts to "gild the lily and adorn the rose." Almost every attempt he has made to improve upon nature in the matter of flowers has been directed toward the mere addition of more flaunting colors. The chrysanthemum has been "improved" from a beautiful daisy-like flower to an ugly mop of yellow, pink or white strings as big as a cabbage. A tissue-paper imitation has quite as much claim to our admiration. There are, to be sure, certain flowers whose shapes lend themselves more readily to the florist's art than others, and of these the rose

and carnation may be cited as examples. Nature even points the way in such flowers as the water-lily and lotus, and in less measure in mandrake, magnolia, barberry, and hepatica. All these, it will be noticed are simply saucer-like flowers, possessing no special beauty of form. But when it comes to others, whose first claim to attraction is in the marvellous fashioning of the flower cup, man's barbaric taste in matters of beauty is revealed in all its ugliness. Double morning glories, petunias, bellworts and others are in the botanical sense monstrosities and they are no less monstrosities in any esthetic sense. Half the charm of the daffodil and narcissus lies in the clear cup outlined in the center of the flower. To double such a flower, is to render it worthless, if measured by any standard of beauty, except that of a savage. To really improve a flower, we ought to strengthen and deepen those qualities that give it beauty. To enlarge the parts, to increase the clearness of their coloring, to add to the delicacy of their perfume and the texture of their petals may well be among our aims, but if a mere display of colored petal is sought, why bother with flowers at all when something just as good can be made in half the time by a three-dollar-a-week girl with a few pieces of wire and some colored cloth or paper?

* * *

In the *Plant World* for October is an article by Prof. J. C. Arthur on the delayed germination in the cocklebur (*Xanthium*) in which the author seems to be still in the dark as to the reason why the upper of the two seeds in the bur does not germinate readily under normal conditions. If the editors of the *Plant World* will consult recent numbers of the *Botanical Gazette,* or even read carefully THE AMERICAN BOTANIST, they will find that Mr. William Crocker has discovered that the delay is due to the completeness with which the seed-coat of the upper seed excludes oxygen.

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